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CIPA-ICORP-ISCARSAH 2017 Joint Meeting

Conference Proceeding

Edited by
CIPA-ICORP-ISCARSAH 2017 Joint Meeting Committee

ICOMOS ICORP Iscarsah

Foreword

ICOMOS holds its General Assembly every year and triennial General Assembly every three years. Till date, ICOMOS has held 18 sessions of its triennial General Assembly, twelve in Europe, two in Asia, two in North America and one in Africa. The General Assembly and the Scientific Symposium provides great opportunity for heritage professionals and enthusiasts to come together on a common platform to deliberate on various aspects of heritage conservation and management. Young professionals and enthusiasts also get a chance to interact with experts and comprehend the emerging issues and case studies on conservation and management of cultural resources. ICOMOS India organized the 19th triennial General Assembly in Delhi, India from 11th – 15th December, 2017. The theme of Scientific Symposium is "Heritage & Democracy". More than 1,500 delegates from around the world attended the events. These provided the great opportunity to promote international co-operation and strengthen understanding and communication in the field of heritage.

This proceeding is generated by the papers presented in CIPA-ICORP-ISCARSAH 2017 Joint Meeting. After disasters, information concerning the state of cultural heritage is essential. To share the information of cultural heritage conservation and coordinate protection efforts, CIPA will work cooperatively with ICORP and ISCARSAH, and hold a joint meeting during 2017 ICOMOS General Assembly in New Delhi, India. ICORP and ISCARSAH are two of the International Scientific Committees (ISCs) of ICOMOS. ICORP enhances disaster risk management and resilience for built cultural heritage; ISCARSAH serves as a network for experts in the field of conservation of heritage structures. Individually, they have been successful in their efforts to protect cultural heritage through conducting research, developing conservation theory, holding international conferences and training activities. According ICOMOS principles, cross-disciplinary collaboration between ISCs has been encouraged. The idea of the three-ISCs collaboration can be traced back to April 2016. Afterward, in August, part of the members of the board, Professor Andreas Georgopoulos, Professor Mario Santana and Professor Alex Yen, Dr Rand Eppich, and Gustavo Araoz, President of ICOMOS, made an initiative discussion and drafted a proposal. The partnership of the three ISCs was officially confirmed during the meeting of ICOMOS 2016 General Assembly in Istanbul this October. Through the close collaboration, CIPA, ICORP and ISCARSAH aim to share the resource such as research results and experts, making the network of cultural heritage conservation extended.

A joint meeting is held on 9 December 2017 during 2017 ICOMOS triennial General Assembly in New Delhi, India. The achievements of the cooperation are highly appreciated. To promote the cooperation, CIPA, ICORP and ISCARSAH have appointed two representatives respectively; Professor Mario Santana and Professor Alex Yen will be on behalf of CIPA. The preparation for the preliminary work of 2017 joint meeting will be done by Professor Alex Yen and China University of Technology.

Consistent with the objective of ICOMOS, cross-disciplinary collaborations between International Scientific Committees has long been encouraged. For promoting the exchange of information and knowledge on cultural heritage conservation, CIPA, ICORP and ISCARSAH, the three ISCs are organized cooperatively the CIPA-ICORP-ISCARSAH 2017 Joint Meeting (CII 2017). The 30 papers of CII2017 on cultural heritage studies are cross-disciplinary by covering topics at least in two fields of CIPA, ICORP and ISCARSAH. Topics of interest include, but are not limited to, the following areas:

a.   Research trends, results and findings
b.   Integration platform
c.   Education and knowledge dissemination
d.   Public participation and engagement
e.   Case studies for application
f.   Possible collaborations of ICOMOS International Scientific Committees for the future

Alex Yaning Yen
Editor / Chair of CIPA-ICORP-ISCARSAH 2017 Joint Meeting

Andreas Georgopoulos, Gorun Arun, Rohit Jigyasu
Editorial Board

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CIPA-ICORP-ISCARSAH 2017 Joint Meeting Programme

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	Keynote Speech 1	
4:50pm - 5:10pm	■ **Mr. Kamal Kishore** Member, National DIsaster Management Authority, New Delhi **Title: Disaster Risk and Uncertainty in the 21st Century: Protecting Cultural Heritage** ■ Moderator: Prof Andreas Georgopoulos	
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	■ **Dr Samir Abdulac** Chair of ICOMOS Working Group on the Safeguard of Cultural Heritage in Syria and Iraq **Title: Project ANQA in Syria 3D Capacity Building in a War Torn Country** ■ Moderator: Prof Gorun Arun	
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* CIPA has held its general symposium in September 2017; CIPA members can join ISCARSAH/ICORP meetings as observers.

Keynote Speakers and Moderators

- **Keynote Speaker**

  Mr. Shri Kamal Kishore

  Member, National Disaster Management Authority, New Delhi

- Kamal Kishore has worked on disaster risk reduction and recovery issues for over 22 years at the local, national, regional and global levels. Before joining the National Disaster Management Authority, he worked with the United Nations Development Programme (UNDP) for nearly 13 years in New Delhi, Geneva and New York. At UNDP headquarters he led global advocacy campaigns to address disaster risk reduction concerns in the UN's Sustainable Development Goals and the post-2015 development agenda. As program advisor, he also led the development of disaster and climate risk management related elements of the UNDP Strategic Plan (2014-17).

- As UNDP's regional advisor for South and South-West Asia, he supported more than 10 countries on a range of public policy and institutional development issues, while also advising them on the use of appropriate risk reduction tools and methodologies. Prior to UNDP, he served at the Asian Disaster Preparedness Centre as Director of Information and Research, and Manager of the Extreme Climate Events Programme covering Indonesia, the Philippines and Vietnam. This was preceded by intensive field experience with The Action Research Unit for Development in India where work on post-disaster reconstruction and resettlement after two major disasters – the Uttarkashi and the Latur earthquakes in 1991 and 1993.

- He has a Bachelor's degree in Architecture from the Indian Institute of Technology, Roorkee, and a Master's degree in Urban Planning, Land and Housing Development from the Asian Institute of Technology, Bangkok.

Moderator

Andreas Georgopoulos
Professor of School of Rural and Surveying Eng.
National Technical University of Athens

Dr. Georgopoulos is Director of the Laboratory of Photogrammetry since 1996. He is President of CIPA since 2015. He is also Visiting Professor in the RLICC (Catholic University in Leuven) Postgraduate Course for Monument Preservation, visiting professor to the Cyprus Institute (STARC) and CUT. His research interests focus mainly on geometric Recording of Monuments using contemporary techniques.

- **Keynote Speaker**

Dr. Samir Abdulac

Chair of ICOMOS Working Group on the Safeguard of Cultural Heritage in Syria and Iraq

- Dr. Abdulac as Chair of the ICOMOS Working Group for the safeguarding of cultural heritage in Syria and Iraq, is particularly active in ANQA 3D Project (ICOMOS with CyArk, Yale and Arcadia). He is Vice-President of CIVVIH, the ICOMOS ISC on Historic Towns and Villages, Expert member of CIAV and ICORP. Previous Secretary General and Vice-President of ICOMOS France. Presently, Member of ICOMOS France Advisory board. Board Member of the French Blue Shield Committee, Member of Paris Commission of Sites, Senior cultural heritage advisor at ASOR (Boston).
- He was the founder and Director of a Conseil d'Architecture, d'Urbanisme et de l'Environnement (CAUE 28) in France and has a long professional experience in the revitalization of historic urban and rural areas in Arab countries and Europe where he participated in various capacities on projects with UNESCO, Harvard University, the World Bank, UNDP, the AKAA as well as with central and local governments.
- He also lectured in many countries and has published about a hundred

articles and reports. He holds a PhD. in Urban Planning, was graduated as an Architect successively from Paris ENSBA and London UCL Bartlett School, and was decorated as "Officier des Arts et Lettres" by the French Ministry of Culture.

Moderator:

<u>Gorun Arun</u>

Professor, Vice rector for research and planning,
Yildiz Technical University, Faculty of Architecture,
Structural Systems Division, Istanbul

Dr Arun is an architect and engineer who has evaluated many historic masonry structures using photogrammetry. She is President of ISCARSAH. She spent her years studying protection and safely handing historical heritage down to next generations. She is Editor of International Journal of Architectural Heritage. Her research activities focus on diagnosing structural problems of existing buildings.

Oral Session I Moderator
• **<u>Hsiao-Wei Lin</u>** • **Assistant Professor, Department of Architecture, Chung Yuan Christian University, Board Member of TICCIH**

Dr. Hsiao-Wei Lin is an assistant professor in the Department of Architecture at the Chung Yuan Christian University, Taiwan. She holds an MLA and a PhD from the University of Edinburgh, UK. Her researches focused on the reuse of cultural heritage, cultural landscape and landscape planning. She has worked on the practical conservation works as well as research projects internationally. She is a Board Member of The International Committee for the Conservation of the Industrial Heritage (TICCIH), and has been the chairman of Organizing Committee for the General Assembly of the XVth TICCIH Congress in Taiwan in 2012.

Oral Session II Moderator

	• **Meltem Vatan** • **Associate Professor, Deputy Dean of Architecture and Design Faculty, Bau Bahcesehir University, Istanbul**

Dr. Vatan is an architect with extensive experience on structural systems, cultural heritage and disaster risks that has led her to a number of site works, projects, academic papers and grants as well. She received her PhD in Structures at Yildiz Technical University, Istanbul and worked in the same institution until 2011. She is the author of several academic papers on structural systems, traditional structural systems and cultural heritage risks. She is an expert member of ICOMOS, ICOMOS ICORP, ICOMOS ISCARSAH and Director of ISCARSAH Turkey. She currently works at Bahcesehir University, Faculty of Architecture and Design as a Vice Dean.

	Forum Discussion Moderator
	• **Mario Santana Quintero** • **Assistant Professor, Architectural Conservation and Sustainability, Department of Civil and Environmental Engineering, Carleton University**

Dr Santana Quintero is the Director of the NSERC Create program "Engineering Students Supporting Heritage and Sustainability" based at the Carleton immersive Media Studio Lab. He has a PhD in Engineering from the R. Lemaire International Centre for Conservation (University of Leuven, Belgium). He is also a guest professor at the Raymond Lemaire International Centre for Conservation (University of Leuven). Along with his academic activities, he serves as ICOMOS Board member and he is the past president of the ICOMOS Scientific Committee on Heritage Documentation (CIPA).

	Chair of CII Joint Meeitng
	• **Alex Yaning Yen** • **Director of Center for Cultural Site Rehabilitation and Development, Faculty of Architecture Department, China University of Technology, Taiwan**

Dr Yen is the expert and board member of the ICOMOS Scientific Committee on Heritage Documentation (CIPA). He led and leased a

Taiwan's National Monument to be part of CyArk 500 Challenge in 2016. He has a PhD in architecture and conducted a series of conservation, disaster risk management, and digital preservation works to nationwide historic buildings, monuments with his expertise as an experienced practitioner and academic.

PROJECT ANQA IN SYRIA: CAPACITY BUILDING IN A WAR TORN COUNTRY

Samir Abdulac, Elisabeth Lee and Stefan Simon

ICOMOS Working Group on the Safeguarding of Cultural Heritage in Syria and Iraq

Abstract

The Anqa Project general aim is to encourage emergency 3D recordings of at-risk cultural heritage sites in the Middle East and North Africa. In Syria, the project is particularly concerned with providing a capacity building within the major relevant institution and to the training of young cultural heritage professionals. This begins with survey of still-standing monuments as to be prepared for possible risks and changes.

Training sessions were organized in Lebanon with exercises in photogrammetric and laser capturing 3D data. The project included a provision of equipment, as well as computer programs. A first batch of sites in the World Heritage historic city of Damascus as being representative of the typological variety of urban historic buildings in this city. The progress of the local team was monitored and distant technical support and guidance provided. Visual output has just been processed.

Anqa Project represents a new challenge for ICOMOS as it includes setting up a working technical, financial and institutional partnership between half a dozen other specialized organizations (Arcadia, CyArk, DGAM, ICOMOS, UNESCO and Yale University) based in different countries and to respond to emergency needs in a war situation, with difficult material and logistical issues. The good results so far reached are due to the enthusiasm and dedication of all participants. Further steps should imply an open access website, a sustainable national computer inventory as well as an extension to other countries in the region.

Key words: War, Syria, 3D, Inventories, Capacity Building, Sustainability

Aims

Anqa means "phoenix" in Arabic and the purpose of the Anqa Project is to support emergency documentation efforts of at-risk cultural heritage sites in the Middle East using new technology to create accurate 3D recordings of heritage sites in their current status. Resulting engineering-grade data should inform local conservation decisions about the sites and provide a database of open access annotated data, which can be used by researchers around the world.

A specific concern of the project is to develop a new sustainable activity in the region by empowering local professionals. With training and tools, participants will acquire the skills needed to continue data capture of sites beyond the project, guaranteeing capacity building and a sustainable documentation of sites in considered country.

Partners

The original partners of ANQA Project were ICOMOS (Directorate General and Working Group on Safeguarding Cultural Heritage in Syria and Iraq), CyArk, a specialized international non-profit organisation based in California, and the Institute for the Preservation of Cultural Heritage (IPCH) at Yale University. A generous support was provided by Arcadia, a UK based grant-making fund. A UNESCO program in Beirut provided a much-appreciated logistical collaboration. Our local on-field partner was the Syrian Directorate of Antiquities and Museums (DGAM) which has in spite of the war independently developed multiple activities across the country, including computerization, museum inventories and a website. ICOMOS has to provide an interface between Arcadia fund and its partners and to provide oversight regarding the grant awarded by Arcadia.

Project History

The human causalities and the disruption of local communities as well as the intentional or collateral destruction of cultural heritage is a catastrophic event for humanity. We are continuously losing important assets that are our common legacy.

From their previous knowledge of Middle Eastern countries and their conflict monitoring activity, the members of ICOMOS Working Group on Safeguarding Cultural Heritage in Syria and Iraq were convinced by the key role played by local professionals and by the importance of providing them with documentation, risk preparedness and conservation skills.

New technologies in 3D reality capture such as 3D laser scanning make it possible to

record monuments and sites in incredible detail and accuracy at a fraction of the time and cost of conventional surveying. The resulting engineering grade data is used to create dimensioned drawings and rich visualizations of the site, and the digital data can be made available for international scholars to study. This is what we chose to provide.

ICOMOS had already a relationship with CyArk, which had an impressive worldwide experience, thanks to our president's participation in its board. A Memorandum of Understanding was passed between them in June 2015 and was soon presented during the Global Coalition launch at the World Heritage Committee meeting in Bonn. Yale partnership was soon added. The Director of its IPCH happened also to be the President of ICOMOS International Scientific Stone Committee. The DGAM immediately expressed its interest and a proposal was submitted to Arcadia the same month. Unfortunately due to decisions' annual calendar was not examined and accepted before April 2016.

Fig 1- Working Group members visiting the DGAM survey team in Damascus © abdulac

After discussions and refinement, a more detailed proposal including a cooperative research agreement between the three partners sent by ICOMOS to Arcadia in September 2016.
Self supported by CyArk, early training had to be held in UNESCO regional office in Beirut in January and June 2016 and a visit from the heads of ICOMOS WG and Yale IPCH was undertaken in Damascus in December 2016 to prepare the final training session that was given in January 2017.
On-site 3D surveys in Damascus began soon afterwards and were mostly achieved by the end of August 2017. Yale University however withdrew from the project just a few weeks ago, fearing institutional complications. An alternative sites for the publication of existing surveys is presently being discussed with Arcadia.

Half a dozen universities, public institutions and foreign organizations were meanwhile contacted in Iraq, but if training is rather easy to organize, an eventual sustainable activity seems much more difficult to set up. The issue may be tackled when Syria project ends.

Training

For safety reasons, the training was not organised in Syria, but in nearby Lebanon. Thanks to a EU funded program, UNESCO regional office in Beirut provided its logistical support, added to its experience in Syria and Lebanon.

Following successful preliminary trainings on laser scanning, photogrammetric and panoramic image capture, a full training was conducted under the requested grant. This training focused on refining data capture techniques and provided additional guidance to the DGAM on the site recording forms and pertinent information.

Two CyArk experts conducted the training from 16 to 26 January 2017 at the UNESCO offices in Beirut and on site at the Temple of Echmoun, a Phoenician archaeological site located approximately 40 km south of Beirut.

The training was used to review completed site recording forms and exchange any of the data collected in Damascus as a result of the preliminary training and borrowed equipment. Preliminary data was shared via summary electronic correspondence, but file size and connectivity challenges necessitated an exchange of physical hard drives and memory cards.

The DGAM selected trainees in architecture, archaeology, engineering and computer science. Most of them were young, but some middle level staff also attended. A lot of them were from Damascus, but other provinces were also represented. And many women participated. All trainees evidenced an extraordinary interest, a wish of learning and full dedication. The Project utilized a selection of LiDAR, structured light scanning and photogrammetric equipment, drones and dedicated methodologies.

Fig. 2 – Training conducted at UNESCO Beirut office in January 2017 © Anqa

The participants excelled during the training and clearly demonstrated their proficiency in capturing 3D . About fifteen trainees finally received a certificate of participation.

Sites Selection

The Anqa Project has documented six historic architectural sites located in the World Heritage site of Damascus, determined in coordination with the DGAM. They were chosen to illustrate the architectural variety of historic buildings in the walled old city, at a time when shelling and fires were threatening. Their public status also allowed easier work conditions.

1. **Azem Palace (Museum of Popular Arts and Traditions):**

   Palace, built in 1749-52 by Asaad Pasha al Azem, the Ottoman governor of Damascus.

2. **Madrassa al-Jaqmaqia (Arabic Calligraphy Museum):**

   School built in 1418-30 by Jaqmaq al-Argunsawi who was then the Mamlouk Governor of Damascus.

3. **Bimaristan Nur al-Din (Museum of Arabic Medical and Science History):**

   Building was originally founded as a hospital and a medical teaching centre by Nur al-Din Zinki, ruler of northern Syria and Iraq, in 1154.

4. **Hammam Nur al-Din**

   Public Bath founded between 1154 and 1172 by Nur al-Din Zinki.

5. **Khan Asaad Pasha:**

Caravanserai built in 1752 by Asaad Pasha al Azem, the Ottoman governor of Damascus.

6. Ananias Chapel:

This underground site reputedly includes a part of the house of St Anananias where St Paul took shelter (1st century AD), with later elements.

Fig. 3 – Laser survey at al Jaqmaqia School 2017 © Anqa

This choice was to provide a sort of "Noah Ark" (one of each kind: housing, learning, health care, bath, commercial facility a religious building), a typological variety of small or middle-sized urban historical buildings. Their survey was initially THE objective; it gradually became also a mean of providing a continuing field exercise for the trained beginners. Expert authorities may later on choose other cultural sites in urban or rural areas, inside or outside Damascus.

Fieldwork

CyArk supported the DGAM remotely throughout the field capture.   This included advising on technical issues as they arise, coordinating data transfer to CyArk offices and providing additional instruction to the DGAM via webinars, phone calls and extended written tutorials

The data capture and transfer was slower than expected in the beginning. To help further their work on the project, CyArk developed a detailed work plan for the remaining sites that were to be documented by the DGAM in the scope of Project Anqa. After top-level contacts with ICOMOS, an outstanding work for the six sites was completed by the DGAM on 22 August. As soon as the DGAM completed a site, CyArk arranged for the data to be transferred from Damascus to the UNESCO offices

in Beirut where they could be shipped via DHL to CyArk. A total of three hard drives were sent in August and the smaller files were uploaded to the shared Dropbox account. CyArk requested the accompanying metadata as well as recorded interviews with site managers. The interviews were completed by DGAM during the week of 27 August and have been shared with Yale. Most site specific metadata sheets were compiled by the DGAM staff and already shared.

Fig. 4 – Panoramic view inside the Azem Palace 2017 © Anqa

In fact, during 2017, beyond the designated six sites, fieldwork was also undertaken by the trainees on additional other sites. Panoramic images were completed for al-Tekiyeh al-Suleimaniyah Mosque. The DGAM has also partially completed LiDAR scanning of the Ommayad Mosque (complementary to *Iconem* external survey) and completed the LiDAR scanning of the Damascus Cultural House.

Data output, review and processing

Upon receipt of the data, CyArk performed a review and assessment of the output. In addition to performing basic data processing, CyArk has created the necessary 3D assets for display on the web so that they may be easily integrated into the Yale database. The raw laser scan files for the sites were registered together to create six unified point clouds. The point clouds are currently being uploaded to Sketchfab, a 3D viewer which can be embedded within a website. All photogrammetric documentation was aligned together and six textured photogrammetric models have been uploaded to Sketchfab that is shared with Yale. The raw .obj textured models have also been shared directly with Yale via Dropbox. A data summary sheet for each site is being generated by CyArk, which describes the different technologies employed by the DGAM as well as a quantitative analysis of site coverage and scanning resolution. CyArk will continue working with the DGAM to obtain the final metadata sheets and will share the completed 3D as they are completed.
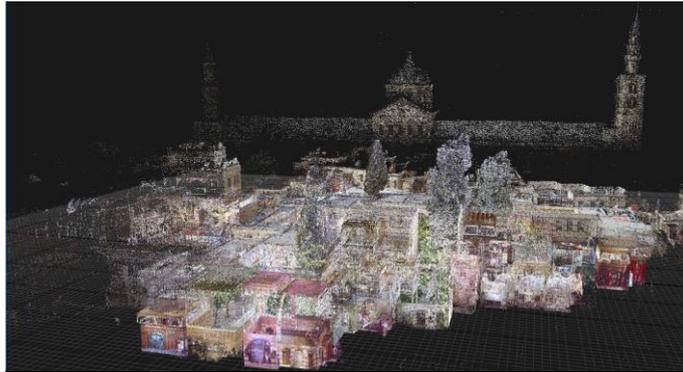
Fig. 4 – A Point Cloud survey of Azem Palace 2017 © Anqa

Yale team hope was that, through this multi-partnered and interdisciplinary effort, Project Anqa may serve as a foundational platform for the study and documentation of tangible and intangible heritage sites, not only for conflicted regions in the Middle East, but more generally around the world.

Project recognition

Since beginning the project, there have been many opportunities to highlight the work and make future connections to additional support. Professor Stefan Simon of Yale's IPCH was invited to present Project Anqa in front of a Congressional Hearing in Washington, D.C. on 8 September 2016. This opportunity allowed for increased exposure for the project in front of the National Endowment for the Humanities as well as members of the United States Congress.

Additionally, the Chair of ICOMOS Working Group was invited to present Project Anqa at the International Conference on the Protection of Cultural Heritage in Conflict Areas, Abu Dhabi, December 2016, and at a Side event of the 41st World Heritage Committee Meeting in Krakow, July 2017, and multiple international meetings such as in Beirut, Leipzig, Lens, London, Oslo, Seoul, Rome, Tunis or Vienna or Tunis in 2016 and 2017.

Fig. 5 – A Photogrammetric model of al Madrassa al-Jaqmaqia 2017 © Anqa

In August 2017, the team at Yale wrote and presented a paper on Project Anqa at the 26th International Symposium of CIPA on Digital Workflows for Heritage Conservation in Ottawa, Canada. Ms Elizabeth Lee, Managing Director of CyArk, was invited as a Keynote Speaker at the Symposium.

Fig. 6 – A Photogrammetric view of Khan Asaad Pasha 2017 © Anqa

Other endeavours in Syria

Other actions using 3D surveys before and during the armed conflict are to be also mentioned, such as Japanese and Russian ones in Palmyra, the French one in the Antique northern villages, the Hungarian one in Marqab castle, a Czech one at Aleppo minaret. French *Iconem* start up with Yves Ubelmann has provided breathtaking drone and land views of Aleppo, Damascus, Palmyra and the Krak des Chevaliers. Recent views taken during the conflict implied an on the ground personal intervention of foreign experts, sometime with Syrian assistants. The image processing is however

undertaken abroad afterward.

Conclusions

An initial criteria was that the grant was to be considered a success if the minimum number of sites (6) are recorded and made available via open access. As a publication should soon follow, we are already on a good way. We also successfully added capacity building and the setting up of a national 3D surveys sustainable activity.

Project Anqa illustrate how ICOMOS may respond to an emergency situation by setting an intersectorial, multiple international partnership and funding.

The grant has allowed the first phase in Project Anqa. As an outcome, Project Anqa hopes to refine the methods and relationships necessary for the continued capture of high risk sites throughout the Middle East and North Africa.

Working with teams and sites located in a conflict zone, comes with its own set of challenges and setbacks. First of all the survey team should work in a safe and secure environment. Its working conditions should be as normal as possible given existing shortages (electricity, internet, etc.). A major challenge to Project Anqa was and has continued to be the transfer of large files out of Syria.

An international professional organization has to remain neutral, particularly towards political pressure. We however cannot expose our trainers to risks in conflict zones like smaller more adventurous structures. External funding and administrative delays may also limit our flexibility and reactivity in emergency situations and generate misunderstandings.

In more comfortable situations, it seems better to choose between a priority to Fieldwork or to capacity building, given the limited amount and duration of grants.

Many organizations are now capturing 3D data of cultural sites, but often the results are desperate and unavailable. Working directly with local state boards of antiquities, international cultural and technical experts, in addition to scholars should allow for a more cohesive product to be shared with the wider cultural community.

New comprehensive architectural and urban inventories, with written, visual and geographical databases, have to be specifically developed for the Region. A connection between ICOMOS Anqa and Amal projects may also be explored in the future.

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RISK MANAGEMENT POTENTIAL OF TECHNICAL DATA INVENTORIES ON BUILT CULTURAL HERITAGE: A CASE STUDY FOR THE CHURCHES OF THE PORTUGUESE ROUTE OF THE ROMANESQUE

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Abstract

The proposed paper discusses the importance of having adequate data inventories about the technical characteristics of built cultural heritage properties for the management of both extensive and intensive risks. As a case study, the paper presents the Property Identification Form (IDI Form) developed to compile and organize the technical information collected from surveys carried out in the churches of the Portuguese Route of the Romanesque (RR). The information collected from each property by the IDI Form involves geometric data, structural characteristics, data on the construction processes, the state of conservation and existing damage, reference to interventions carried out over time, and data on the interaction of the property with its surroundings. The IDI Form establishes an important contribution to organize such technical data in a common format, enabling its statistical analysis for risk management purposes. The IDI Form was used in the survey of the 44 churches of the RR and outcomes of some statistical analyses of the data that were performed are presented herein to illustrate their potential for cultural heritage risk management.

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* Corresponding author

Key Words: Risk Management, Data Inventory, Built Heritage

Introduction

Multiple efforts are increasingly being made to improve disaster risk reduction capacity worldwide driven by international frameworks such as the Sendai Framework for Disaster Risk Reduction 2015-2030 or the International Risk Governance Council Risk Governance Framework. These and other frameworks recognize the importance of cultural heritage and its irreplaceable value for society. Still, safeguarding cultural heritage implies the need to act on both the prevention and preparedness sides of the disaster management cycle, as well as the need to develop risk management strategies that cover both "everyday" (extensive) and severe (intensive) risks. Extensive risks have not yet received sufficient and explicit attention from the various international frameworks, mainly because they are often unreported. However, evidence suggest that a large proportion of cultural heritage damage and losses is caused by everyday extensive risks.

The availability of relevant data is essential to develop effective risk and disaster management strategies. For the particular case of preserving built cultural heritage properties, the availability of inventories with technical characteristics (e.g. geometric surveys, data on the construction techniques or material properties) is fundamental for managing both extensive and intensive risks. Moreover, efficient management strategies also require the surveyed data to be organized in a standardized format so that risk assessment and mitigation can be performed in a more systematic and effective way. This standardization feature of the data is particularly relevant for managing sets of heritage properties with similar construction processes and architectural characteristics.

In this context, the proposed paper presents the development of a standard Property Identification Form (termed the IDI Form) for the systematic collection of relevant technical data about a specific type of cultural heritage property. The IDI Form presented herein was developed for churches of the Portuguese Romanesque period and was used to collect data for the 44 churches of the Portuguese Route of the Romanesque (RR) (RR, 2017). For each church, the IDI Form allows the recording of its geometric characteristics, structural typology, construction process(es), level of damage, changes and works carried out over time, the existence of heritage assets attached to the building, and its interaction with the surrounding environment. The collected data sets the basis for a technical database and a comprehensive cultural heritage property management tool. The proposed paper discusses the main characteristics of the IDI Form and presents some results obtained from the statistical

treatment of the data recorded by the survey of the 44 churches to illustrate the potential of this data for risk management.

THE IDI Form

Data collection forms are developed to support and enhance the efficiency of inspection and diagnosis procedures over time. By providing a systematic organization system for the relevant data of heritage properties, they facilitate data updating over time as well as analysing data variations by comparing parameters recorded at different times using the same format. In general terms, this type of form should be able to characterize the overall geometry of the property, the construction solutions that were adopted, the state of conservation of the property and its surrounding environment, among other aspects.

The IDI Form presented herein was specifically developed for the RR to establish a tool providing a systematic organization of technical data. Given the numerous inspections and works carried out in the RR properties by several institutions over time, e.g. see (Costa et al., 2012a; Costa et al., 2012b; Costa et al., 2012c; Arêde and Paupério (2014); Arêde et al., (2015)), the data gathered by the IDI Form will form a database with the evolution of several properties of the buildings and the history of the works that were performed. In this context, the IDI Form for churches of the RR was developed to compile all the relevant technical data for this type of construction in a single form. The systematic and uniform inventory of all the technical data that are relevant for these heritage properties has several advantages for their risk management and represents a central tool to support decision-making. For example, a careful statistical analysis of that data can help to identify links between heritage properties that can be used to optimize risk mitigation strategies.

The IDI Form was developed in digital format so that it could be filled using any device capable of reading Adobe Acrobat documents (i.e. PDF). Among other things, this facilitates exporting the collected data (which is done automatically) and the possible extension of the form if more fields are required in the future. The current version of the IDI Form collects data on general parameters such as the type of roofs and ceilings of the chancel and of the main chapels, or if there are decorative cultural heritage assets attached to the walls or ceilings, as well as data on more technical parameters such as wall slenderness indexes or if wall corners are built with interlocking masonry. The form also records specific data that can be used to perform a risk assessment for different intensive or extensive hazards.

The IDI Form is divided into 8 main sections that are: Identification of the property; Geometric characterization of the property and walls; Classification of the masonry walls of

the property; Other construction elements of the property; Relation of other elements with the property; Interaction of the property with the surroundings; Evaluation of the general state of conservation and damage records; Identification of structural macro-elements. To illustrate the format and organization of the form, Figures 1, 2 and 3 present parts of the form corresponding to part of the geometric characterization of the property, to part of the classification of the walls of the property and to the building interaction with the surrounding environment.
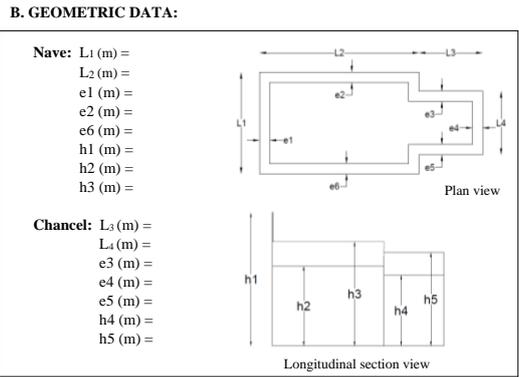
Figure 1. IDI Form: part of the geometric survey section.

Figure 2. IDI Form: part of the masonry wall classification section.

F. INTERACTION WITH THE SURROUNDING ENVIRONMENT:

Figure 3. IDI Form: part of the survey regarding the building interaction with the surrounding environment.

Data collected from the churches of the RR using the IDI Form

To illustrate the potential of the data recorded by the IDI Form, some results of the analyses performed using the data collected during the technical surveys to the 44 RR churches are presented in the following. The presented results focus on the analysis of parameters that are relevant to aspects both related to intensive and extensive risk assessment and mitigation.

Prior to this data analysis, a brief overview of the RR is also presented, focussing on its objectives and on the type of monuments that are included in the RR.

The Portuguese Route of the Romanesque

The RR is a cultural route of the northern region of Portugal that promotes the integrated and sustainable development of the region, as well as territorial competitiveness, cohesion and identity. It involves 58 Romanesque-style monuments located in an area that includes 12 municipalities (Figure 4). The RR was created to harness the cultural potential of the region and promote its sustainable development. The cornerstone elements which support the RR are the conservation and enhancement of the economic values of the Romanesque-style monuments and the valuable intangible heritage of that region, such as the traditions, the gastronomy and the arts and crafts. The preservation and promotion of this legacy governed the development of the RR to achieve its broader mission: to drive the development and the sustainable socio-economic growth of the region. Such ultimate goal relies on establishing and promoting an attractive and high-quality touristic framework that would be a reference destination in the national and international fields of cultural and landscape touring.

Figure 4. Location of the RR.

This Romanesque architectural heritage is closely connected to the founding of the Portuguese nation and dates as far back as the 11th century. Due to the evolution of the socio-economical characteristics of that region over the centuries and to the lack of adequate conservation and use, many of these constructions became extremely degraded. Nevertheless, the local population still had a strong emotional connection with that heritage and was seeking to be involved in their recovery and reuse to foster regional growth. Therefore, when the project began in 2000, the active engagement of the local population in the project was seen as an essential factor for success to be achieved. In general terms, the objectives of the RR are (RR, 2017): to promote land-use planning by valuing the Romanesque-style cultural and architectural heritage; to create a new productive sector capable of generating wealth; to contribute to the change of the internal and external image of the region; to promote capacity building of the human resources of the region; to contribute to the development of qualified employment.

The cultural heritage properties that integrate the RR belong to the several municipalities and have different typologies such as churches, monasteries, bridges, towers or funerary monuments, among others (Figure 5).

Figure 5. Examples of cultural heritage properties from the RR.

Most of the properties that integrate the RR are religious heritage constructions and churches are the most common property (there are 44 churches, isolated or part of monasteries). To illustrate the type of churches of the RR, the Church of São Mamede of Vila Verde and the Church of the Monastery of São Pedro de Ferreira are shown in Figure 6. The figure displays the number of the property (Ii), a short description of the church, the date of the survey that was carried out to collect the data for the IDI Form, a note indicating whether it was possible or not to have access to the interior during the survey, some photos of the property and an unscaled floor plan of the church.

	Church of São Mamede of Vila Verde
I6	Located in Felgueiras; it has a single nave and a chancel; it has a bell tower on the main façade and a vestry attached to the south facade of the chancel. There are heritage assets attached to the church
	Date of the survey: 15/03/2016 Access to the interior: Yes
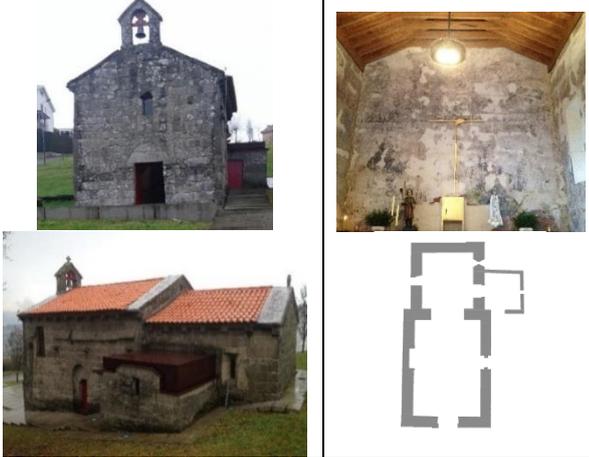
	Church of the Monastery of São Pedro de Ferreira
I12	Located in Paços de Ferreira; it has a single nave with four spans; it has an apse, a narthex, a chancel and a belfry on top of an exterior wall.
	Date of the survey: 10/03/2016 Access to the interior: Yes
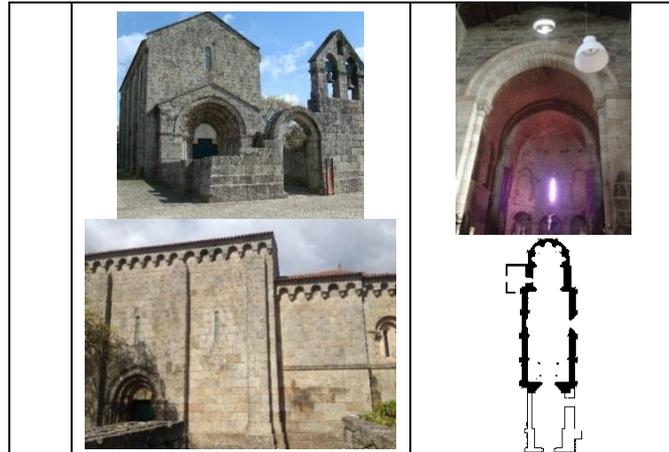
Figure 6. Examples churches from the RR.

Analysis of the collected data

The examples presented herein illustrate some of the aggregated information that can be extracted from the collected data. Due to space restrictions, only a few cases are shown. It is however noted that some of the statistical analyses are only relevant because the architectural, structural and material characteristics of the 44 churches are similar, due to their geographical proximity.

Figure 7 presents an overall view of the state of conservation of the 44 churches in general and of some of their components in particular, namely the exterior walls (Figure 7b), the ceilings and roofs (Figure 7c) and the interior pavement (Figure 7d). As can be seen, most of the churches are in good condition, due to a series of actions for restoration, conservation and risk mitigation that have been carried out in several monuments of the RR since 2003. Figure 8 shows a view the Church of São Mamede of Vila Verde before and after the restoration works. Restoration works were not carried out in some of the churches yet, but are expected to be in the near future.

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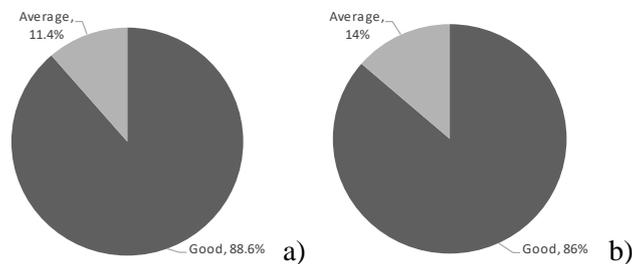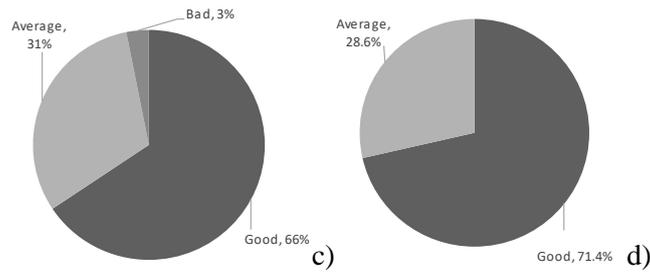
*Figure 7. Statistics representing the overall state of conservation of the churches a),
of their exterior walls b), their ceilings and roofs c) and interior pavement d).*

*Figure 8. Church of São Mamede of Vila Verde before (left) and after (right) the
restoration works.*

Figure 9 presents the analysis of a type of damage that is often found in these constructions: cracks or fractures. The analysis represents the percentage of cases in which this damage is found, across the several types of elements of the 44 churches. As can be seen, this type of damage is mostly found in the walls, particularly in the lateral walls of the nave. This type of damage is often an evidence of problems related to the roof, the foundations and drainage system, or to a lack of capacity of the walls to sustain out-of-plane thrusting from the roof system. However, conclusions can only be established by analysing the damage in the roof systems and the characteristics of the walls.
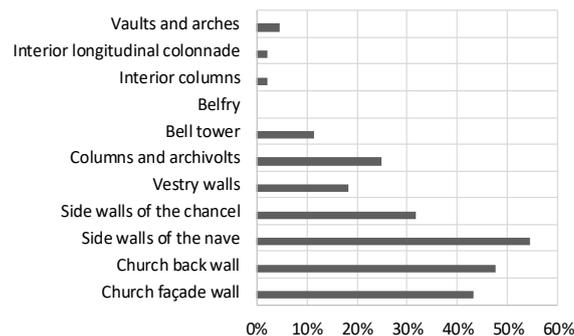
*Figure 9. Damage statistics for cracks or fractures in the components of the 44
churches.*

Focussing on the walls, for example, the survey of their thickness and number of leaves was carried out by analysing areas close to openings. In most cases, the thickness of the walls varies between 0.90m and 1.10m. It was also seen that 84% of the walls that were surveyed

are double-leaf walls. It was however not possible to identify the type of cross section for the remaining 16%, in some cases due to the inability to access the inside of the church to analyse the zones near the openings. Future surveys will therefore need to complement the data inventory using ultrasonic wave and GPR tests. Based on this geometric survey, the walls were classified as resistant or non-resistant for out-of-plane loading. This classification was carried out by determining their slenderness ratio, one of the most relevant parameters when analysing the out-of-plane instability of these elements. These instability issues can be caused by intensive hazards such as earthquakes or wind, but also by slow-acting hazards related to the degradation of the roof system or to loads of large altarpieces leaning on these walls from the inside. The slenderness ratio of a wall is the ratio between its effective height h_{ef} (which depends on the end support conditions of the wall – free, pinned, fixed) and the effective thickness of the wall t_{ef} (which depends on the existence and the efficiency of the connection between the two wall leaves). Given the uncertainty of some of the in-situ conditions, the slenderness ratio analysis was performed for three hypotheses regarding h_{ef} and two scenarios for t_{ef} to simulate different conditions of lateral stability. Therefore, aside from the reference case where h_{ef} is considered to be the total height of wall h, cases reflecting the influence of the connection between the wall and the roof system were also considered. The cases where this connection is considered perfect ($h_{ef} = 0.7h$) and where this connection is considered to be non-existent ($h_{ef} = 2h$) were thus considered as limit situations. With respect to t_{ef}, the two considered scenarios are those that involve considering t_{ef} as the total thickness t of the wall and half of it (i.e. when there is no effective connection between the two wall leaves). The slenderness ratios that were determined were then compared with the limit value defined by Eurocode 8 (EC8, 2004) stating that for a wall to be considered resistant, its slenderness ratio cannot exceed 10. The results obtained for the façade, nave and chancel walls are summarized in Figure 10 that represents the percentage of non-resistant walls found for the 44 churches, considering the different hypotheses. The results show that, despite the apparent robustness of the walls of these churches, they may not exhibit adequate behaviour for out-of-plane loading. If the connection between the two leaves is not effective, most of the church walls will behave as non-resistant to out-of-plane loading. Therefore, more detailed surveys need to be carried out to obtain this information and mitigation measures need to be defined, if necessary, to ensure the robustness of the walls.
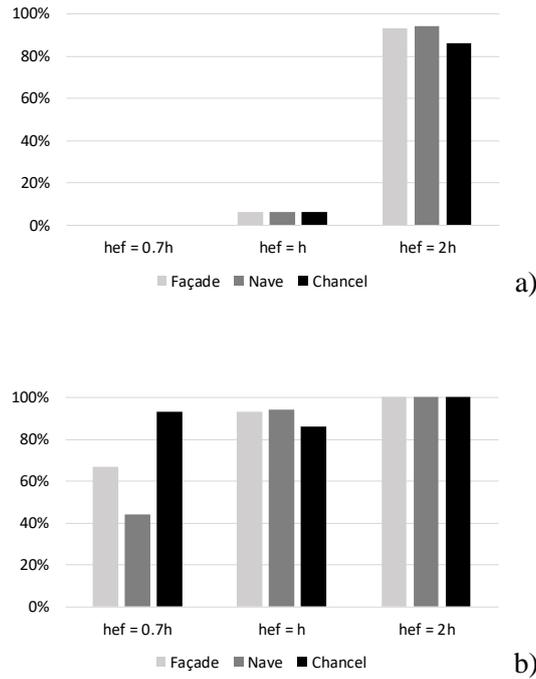
Figure 10. Statistics of non-resistant walls for out-of-plane loading found for the 44 churches: a) $t_{ef} = t$; b) $t_{ef} = 0.5t$.

As an example of a more detailed analysis that led to the development of mitigation measures to address this specific issue, reference is made to the works carried out in the Church of Gondar (Costa et al., 2007) in 2012. In this church, the exterior walls exhibited some degree of connection between the two leaves but external conditions were causing out-of-plane instability: a belfry sitting on top of part of the wall was causing an eccentric load on the external leaf (Figure 11) and the degraded roof drainage system around the belfry was allowing water to infiltrate inside the wall from the top causing additional out-of-plane thrusting. Since the connection between the two wall leaves was insufficient, the external leaf exhibited large out-of-plane deformations. In that situation, the structural conditions of the wall could be represented by the case where tef is 0.5t. and hef is somewhere between h and 2h. Given the results of Figure 10, mitigation actions were therefore carried out. These involved tying the masonry leaves and the corner walls with steel connectors, the injection of consolidation grouts and fixing the drainage system of the roof.

Another type of the information that is collected by the IDI Form refers to changes made to the load bearing structural components of the churches that were carried out over time. The more common modifications that were found are extensions or enlargements of a given room, the cutting of new openings, the wall up of openings, and changes to the structure of the ceilings and roofs. Figure 12 presents the results of the survey of the structural changes that were carried out in the past to the chancel and nave of the 44 churches. As can be seen, a large proportion of the modifications involve changes in the roof structures and cutting new openings in walls. The availability of this information is particularly relevant when analysing the causes of certain existing damages to develop specific risk mitigation measures or when trying to estimate potential future damage and losses due to a hazard that depend on the global structural behaviour of the building.
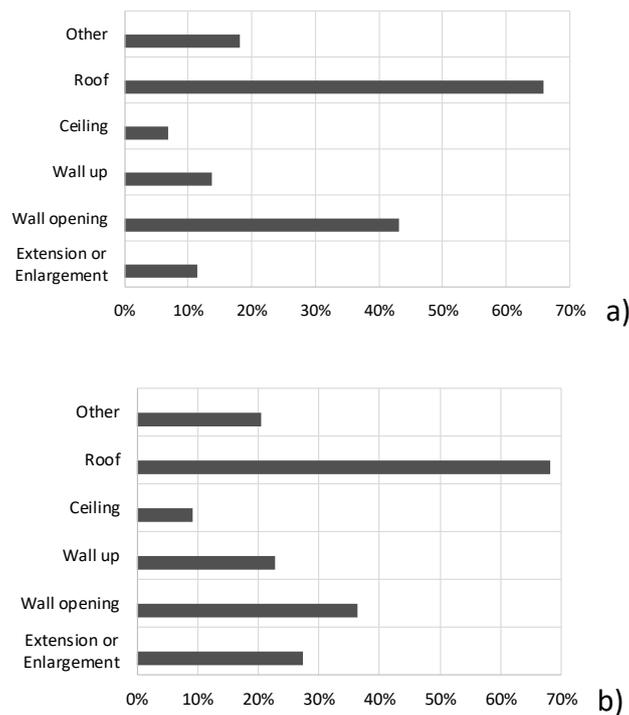
Figure 12. Statistics of structural changes that were carried out in the past to the chancel (a) and nave (b) of the 44 churches.

With respect to the existence of decorative cultural heritage assets attached to the buildings, the data collected by the IDI Form indicates that 84% of the churches have heritage assets attached to the walls and 34% of the churches have heritage assets attached to the ceilings. Most of these attached heritage assets are mural paintings, tiles, gilded woodcarvings or

painted ceiling caissons. Figure 13 shows a few examples of these heritage assets and Figure 14 illustrates the proportion of these assets found attached to walls.
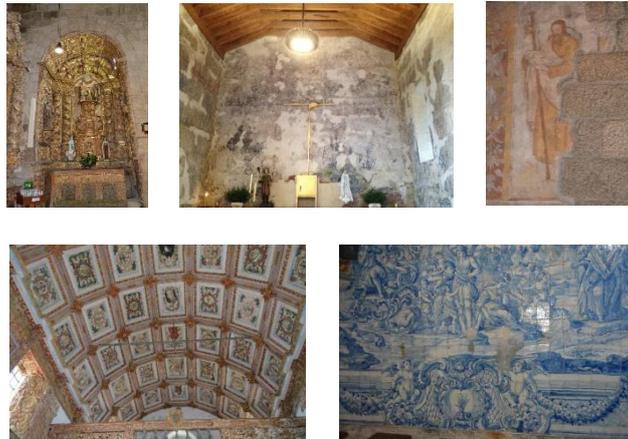
Figure 13. Examples of cultural heritage assets attached to the walls or ceilings of the churches.

The availability of data on the presence and type of attached cultural heritage assets is particularly important when estimating the potential damage and losses due to a hazard since a given hazard intensity that may not cause significant damage to the component supporting those assets may in fact cause a substantial loss in value to those assets. Moreover, when defining risk mitigation measures that involve the components supporting those assets, the type of mitigating action and/or solution needs to account for the presence of those assets. A similar line of reasoning needs to be applied when developing emergency measures for those components after a disaster.
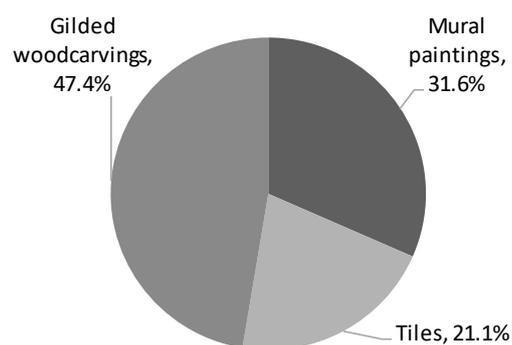
Figure 14. Statistics of cultural heritage assets attached to the walls of the churches.

With respect to the surrounding environment of the churches, one type of information that is collected by the IDI form is the type of slope of the terrain in which the churches are built. This data is particularly relevant for risk management procedures related to hazards such as

landslides, earthquakes or heavy rains. To illustrate the type situations that are found, Figure 15 represents the distribution of the churches along the four classes of slope of the terrain that were considered. As can be seen, only about 7% of the churches are located in a flat terrain. Therefore, most of the churches might be vulnerable to the previously referred hazards. In addition, it was also seen that, when in the presence of a terrace, about 25% of the cases do not have retaining walls or have retaining walls in bad conditions (Figure 16). As such, this data needs to be accounted for when performing risk analyses involving the referred hazards.
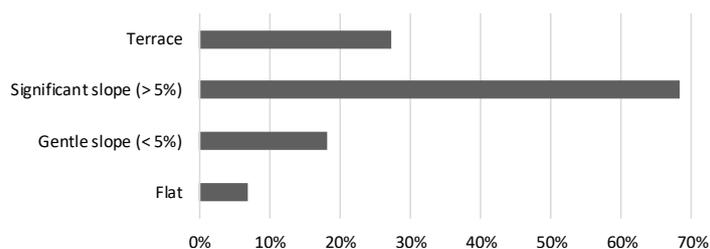
Figure 15. Slope of the terrain where the churches are built.
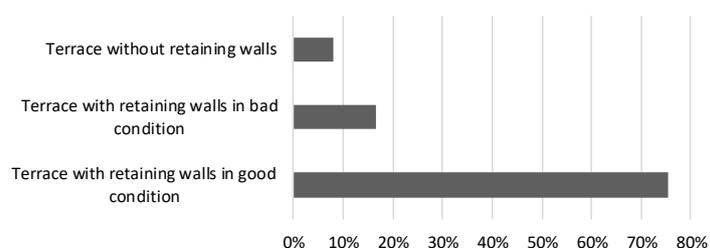
Figure 16. Existence and conditions of retaining walls when the terrain where the churches are built is a terrace.

Final Remarks On The Role Of The Collected Data For Cultural Heritage Risk Management

The possibility of establishing the conservation state of cultural heritage assets and identify the sources of existing damage and/or of ongoing degradation phenomena through systematic surveys provides fundamental data for risk mitigation. Potential losses can be estimated by correlating this information with the type of intensive or extensive hazard involved and the urgency of mitigating measures can be determined from the likelihood of the hazard occurrence. Moreover, having a detailed knowledge about the materials, geometry and building processes of these cultural heritage assets also allows estimating risk mitigation costs and perform cost-benefit analyses to minimise heritage losses. By extending this type of analyses to a large group of cultural heritage properties with similar architectural

characteristics, common issues can be more easily identified. As such, the planning of risk mitigation actions is also facilitated.

Finally, it is noted that surveying data on decorative cultural heritage elements attached to the constructions along with the more technical and structural data, provides a more complete and multidisciplinary view of the immovable heritage asset. As referred before, having this dual information is vital for risk and loss assessment of cultural heritage since a more realistic view of the expected loss in value and of the existing constraints for defining risk mitigation actions can be achieved.

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AUTHETICITY AND INTEGRITY OF ARCHITECTURAL HERITAGE
-Three Cases of Historic Houses and Human-caused Disasters in Seoul-
Trilogy of Relocation, Intervention and Adaptive reuse
with a focus on the Residence of *Han Gyu Seol*

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Abstract

The three traditional houses of case studies were originally in the same historic area in Seoul, Republic of Korea. When these houses were on the verge of demolition due to the dramatic urbanization of the central Seoul, they were partly relocated with dismantle and reassemble technology or totally destroyed： the first case study of the Residence of *HAN Gyu-Seol* deals with the issues of relocation of cultural heritage sites from their original sites, intervention and adaptive reuse of a historic house as an opportunity to conserve the heritage architecture. The three main focus areas of this case are: firstly, review of history of the house and its challenges at the time of urban redevelopment and its designation as a heritage; secondly, the documentation, anastylosis or dismantling and reassembling, and additions of structures on the new site; thirdly and lastly, adaptive reuse of the Hanok to promote Korean traditional tea culture and heritage architecture**;** the second case study of the *YI Seung-Eop* House deals with the issues of anastylosis of a historic house as an opportunity to conserve the heritage architecture. The three main focus areas of the second case are: 1) review of history of the house and its challenges at the time of relocation; 2) reconsider the anastylosis or dismantling and reassembling, and loss of structures on the new site; 3) reassess the *Hanok* restoration to promote Korean traditional heritage architecture**;** the third case study of *ShinMunGwan* and *JoseonGwangMunHoe* discusses rebuilding of a historic architecture as an opportunity to critique the past as well as to unearth its merits. The three main focus areas of last case are: 1) review of the history of

JoseonGwangmunhoe and its HQ *Hanok*, *Shinmungwan*; 2) reconsideration of the challenges at the time of demolishing; 3) reassessment of the rebuilding of *Hanok* to recover the past and to promote the principles of integrity and authenticity.

Key words: *Hanok*, Authenticity, Integrity, Relocation, Intervention, Adaptive reuse

UNDERSTANDING *HANOK*

Grammar of *Hanok*

Hanok is the indigenous house for Koreans, and continues to be built in Korea to this day with proper materials - earth, wood, and the stones from the very nature we are living in; with techniques handed down to us through generations; and based on a sound structure of column and beam with mortise and tenon joints that create aesthetic beauty.   As a result of sound and rational structure, a beautiful eave-line is created.

In other words, the site location, the natural environment, its local materials and traditional techniques are the basic elements for a *Hanok*, the house of Korean wooden structure. The inherent grammar of sustainable *Hanok* involves the following: firstly, the characteristics of spatial compositions of building–courtyards–enclosed wall, warm heated floor room "*Ondol-bang*," cool wooden floor hall "*Dae-cheong* (*maru*)" and raised floor "*Nu* (*maru*)" are enclosed by the front and rear courtyards which are again enclosed by the wall; secondly, the scientific characteristics which is comparable to green growth and environmental theory of present days. During hot summer, cool breeze blows through the wooden floor hall circulating the cold air of the backyard and hot air of the front yard, on the other hand, during the cold winter, warm and cool air convection in the warm heated room "*Ondol-bang*"; thirdly and lastly, the inherent authenticity of the house which is accordant of materials, techniques, structures, and concepts.

In the facade there are three components of 1) raised platform, 2) columns, door and windows and walls and 3) roof on the wooden structure.

To support this statement, we will examine basic information on the Korean environment, natural and social environment.

Environment

- Natural environment
70% of the land in Korea is mountainous. However, most of the land is relatively low, as typically seen in aged terrain. With these geographical characteristics, villages and individual dwellings formed with mountains to the back and rivers to the front. The mountains not only protected houses from the wind but also supplied firewood. The river provided drinking water and agricultural irrigation.

The climate in Korea is moderate. The south easterly wind blows on summer while the dominant wind in wintertime is the north westerly. The South Korea climate in winter is normally long, cold and dry and in summer is humid, hot, and short. Due to this duality in the climate of Korea, two contrasting floor structures of heated floor room and wooden-floor hall in a house appeared.

- Social and cultural environment
Throughout the history of Korea, theories of Yin-Yang-and-five-elements School, *Pungsu* (*Fengshui* in Chinese)[1], Buddhism, Confucianism, Taoism and other philosophies left a lasting imprint on the process of housing evolution.
The principles of Confucianism have dictated family and social lives in Korea. Confucian theories spawned a strong patriarchal family system in Korea and out of this came the tribal village formed of patriarchal blood relations. Ancestor worship and hospitality is the core of sacred obligation in a family. People erect separate family shrines in their homes and provide a guest room in the men's quarter. Since Confucianism called for the separation of the genders, the women's quarters were detached from the men's.
As the house protects humans from severe weather and provides a resting place, Hanok is the most appropriate architecture considering the geographical and climatic features of Korea.

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[1] The term '*Feng Shui*' comes from a Chinese phrase that means "shutting in the wind (that blows life force away) and obtaining the water (that energizes it)." Called by a few other names in Korea meaning the 'jiri (advantage of locality)', or 'jisul' (art of locating dwellings), *Feng Shui* considers earth as having life force that is present not only on Earth but throughout the whole universe, creating everything under the sun.

TRILOGY OF RELOCATION, INTERVENTION AND ADAPTIVE REUSE [2]
Trilogy-1 [3]

Trilogy-1, the case study of the Residence of *HAN Gyu-Seol*, deals with the issues of relocation of cultural heritage sites from their original sites, intervention and adaptive reuse of a historic house as an opportunity to conserve the heritage architecture. The three main focus areas of this part are: firstly, review of history of the house and its challenges at the time of urban redevelopment and its designation as a heritage; secondly, the documentation, anastylosis or dismantling and reassembling, and additions of structures on the new site; thirdly and lastly, adaptive reuse of the *Hanok* to promote Korean traditional tea culture and heritage architecture.

Trilogy-2 [4]

Fig.1 - The YI Seung-Eop House, NamSangol Hanok Maeul

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[2] I did research work on it and submitted the papers through the call for paper procedure. Fortunately all three proposals were taken to present in various occasions of the international scientific symposium:

[3] The 1st paper was taken to oral-present at the 50 years anniversary of ICOMOS Scientific Symposium in Warsaw, June 2015;

[4] The second one was taken as a poster presentation at the ICOMOS Administration Committee Scientific Symposium in Fukuoka, October 2015;

Trilogy -2, the case study of the *YI Seung‑Eop* House, deals with the issues of anastylosis of a historic house as an opportunity to conserve the heritage architecture. The three main focus areas of the study are: 1) review of history of the house and its challenges at the time of relocation; 2) reconsider the anastylosis or dismantling and reassembling, and loss of structures on the new site; 3) reassess the *Hanok* restoration to promote Korean traditional heritage architecture.

Historic House of *YI Seung‑Eop*, one of the Major Carpenters employed by Regent of Korea *DaewonGun* (1820-1898, r 1863-1873) was first built during the reconstruction of the Main Palace *GyeongBokGung* in the 1860's. Designated as Seoul's Folklore Heritage No.20 in 1977 and originally located in *SamGak-Dong*, *Jung-Gu*, Seoul, Korea, it was relocated to the present site of *Namsangol Hanok Maeul*, known as "A Village of Traditional Houses in the Namsan Valley" as part of Namsan Neighbourhoods' Reviving Project of Seoul in 1990s. The dismantling and reassembling technologies were adapted to the relocation project of this house.

The original house showed a typical middle class Hanok (Korean traditional house compound in wooden structure) in Seoul. Its' details explain the intangible heritage of major carpentry work of the late Joseon Dynasty. The present house is composed of *Sarangchae* (master's quarters) and *Anchae* (wife's quarters) only. The various courtyards, guest quarters, gates and walls, storages, and *Haengrang* (servants' and service quarters) were missing, unfortunately, when it was restructured.

Trilogy-3 [5]

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[5] The third one was taken as a poster presentation at the ICOMOS Administration Committee Scientific Symposium in Istanbul, October 2016:
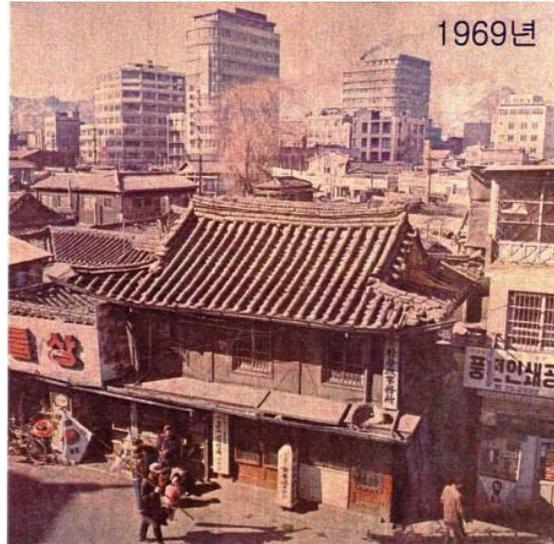
Fig.2 - ShinMunGwan and JoseonGwangMunHoe, 1969

Trilogy-3, the case study of *ShinMunGwan* and *JoseonGwangMunHoe*, discusses rebuilding of a historic architecture as an opportunity to critique the past as well as to unearth its merits. The three main focus areas of the study are: 1) review of the history of *JoseonGwangmunhoe*, Society of the Enlightenment Movement, and its HQ Hanok, *Shinmungwan*; 2) reconsideration of the challenges at the time of demolishing (human-caused disaster); 3) reassessment of the rebuilding of Hanok to recover the past and to promote the principles of integrity and authenticity.

Shinmungwan, a Historic *Hanok* was a printing and publishing company since 1907 and the HQ of *JoseonGwangmunhoe*, the Enlightenment Movement Society. This site was known for a wide range of activities at the beginning of the twentieth century Joseon: the Korean Classics were first published there; the term *Hangeul* for the Korean alphabet was coined and its use as a literary medium was promoted; the compilation of the first dictionary of the Korean language and the Encyclopedia of Korean History were initiated; the Korean Declaration of Independence was written; and Korean identity as a cultural entity was established.

The building was in *Samgak-dong*, Jung-Gu, Seoul, Korea. Remaining photographs and records show a unique double storey *Hanok* faced an alleyway and presumably typical inner residential quarters. In 1969, due to the dramatic urbanization of the central Seoul, it was demolished without considering the future of the past, even before the designation as a cultural heritage site. Though the neighborhood has been changed, a reconstruction plan took off on the same site initiated by private

governance.

CHALLENGING AUTHENTICITY AND INTEGRITY

The Residence of *HAN Gyu-Seol*: Relocation, Intervention and Adaptive reuse

Fig. 3 - The Residence of HAN Gyu-Seol

The Residence of *HAN Gyu-Seol* or *Myungwon* Folk House of Kookmin University, Seoul originally located in JangGyo-Dong, Jung-Gu, Seoul, Korea.

It was first built at the end of 19th century and the Residence was occupied by *HAN Gyu-Seol* (1848-1930), the mayor of Seoul and the minister of Political affairs during the late Joseon Dynasty (1392-1910). At the turn of the century Korea, the owner has been changed and the usage also has been varied from the original purpose as a residence of the mayor of Seoul.

Later at the end of 1970's, the owner's family during the urbanization period presented it to the Lady Tea Master *KIM Mee Hee* (1920-1981). Lady *KIM Mee Hee* was the wife of the President of SsangYong Conglomerate and the owner of the Kookmin University at that time.

To conserve the historic architecture, the City of Seoul came to designate it as a cultural heritage on 17 March 1977 as "Seoul Folklore Cultural Heritage No.7" [6]

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[6] Heritage Classification in Korea: The residence belongs to the Folklore Cultural Heritage designated by Metropolitan City of Seoul. Based on the Article 2 (Definitions) (2) of CULTURAL HERITAGE PROTECTION ACT (CHPA)

It was however relocated shortly after,

When it was on the verge of demolition due to the dramatic urbanization of the central Seoul, it has been decided to relocate to the present site, using the inherited traditional dismantling and reassembling technologies.

History of the house

The inherited traditional dismantling technologies were carefully applied to the residence. Skilled roof tile technician, major carpenters and minor carpenters, and stone mason worked on it.

Heritage Classification (the Cultural Heritage Protection Act, CHA, Korea, amended on Aug.4. 2016)

	City-/Do- designated Heritage	*State- designated Heritage*
Designated Cultural Heritage	Tangible Cultural Heritage	National Treasure
		Treasure
	Monuments and Sites	Historic Sites
		*Historic and Scenic Sites
		Scenic Sites
		Natural Monuments
	Folklore Cultural Heritage	Important Folklore Cultural Heritage
	Intangible Cultural Heritage	National Intangible Cultural Heritage
Cultural Heritage Resources		
Registered Cultural Heritage: Cultural Heritage of early modern Times		
Undesignated Cultural Heritage	General Movable Cultural Heritage	
	Buried Cultural Heritage	

Chart design by Cho In-Souk

The term "designated cultural heritage" in this Act means the following: 1. State-designated cultural heritage; 2. City/Do-designated cultural heritage - Cultural heritage designated by a Special Metropolitan

Careful dismantling work carried on from the clay roof tile through the wooden structure to the mud walls and stone platforms.

During dismantling, manuscripts were founded on the hidden parts of wooden structure.   It revealed the original history of the residence.   One quarter was built in 1853 and the other 1871. Until this dismantling work, the record showed that it was presumably built ca. 1890.

Relocation

In 1980, after dismantling work, it was relocated to the present site, adjacent to *Kookmin* University, *JeongNeung-Dong, SungBuk-Gu*, Seoul, using the inherited traditional reassembling technologies in opposite procedure of dismantling.   And some necessary architectural intervention carried out in the compound.
Main quarter, so called lady's quarter and the family ancestors' shrine were completed.
Master's and guest quarter and interiors were completed as well as gates and various courtyards were completed. The present house is composed of *Sarangchae* (master's quarters), *Anchae* (wife's quarters), *Byeoldang* (detached special quarters), *Sadang* (family ancestors' shrine), *Haengrang* (servants' and service quarters), the main-, inner- and rear gates and various courtyards.

The spatial organization of the various inner courtyards shows the hierarchy of living spaces for a distinguished member of the *Joseon* Society very well and therefore is currently recognized as an archetype of an upper class *Hanok* in Seoul.
Hanok is the organic house of Korean wooden structure.

Intervention

Major Intervention carried out on the site. An artificial reflective pond as well as a Tea Pavilion and a *Chodang* (thatched-roof cottage) were added in the southern edges of the present site when it was restructured. After relocation and intervention, only the relocated area from the original site is the designated Heritage, the additional structures outside the compound are not included in the heritage protection area based on the Korean Cultural Heritage Protection Act because of the Authenticity.
A two (2) - kan Tea Pavilion and a *Chodang* (thatched-roof cottage) and The main gate structure and service quarters were added.

3.4 Adaptive Reuse

The house is being utilized as a space for the education and research of the traditional Korean Tea Culture and *Hanok* architecture. The *Myungwon* Tea Society spearheaded University Tea Culture movements. *Myungwon* is the pen name of the Lady *Kim Mee Hee*, the wife of the owner of Kookmin University at that time.   The *Myungwon* Tea Society organized in 1981. In 1982, an elective course on the tea culture as part of the official curriculum for the first time in Korean Universities commenced and has been very successful until now.

This small pavilion and the reflective pond show the characteristics of *Hanok* architecture as well as the notions of understanding the relationship between the nature and human beings.

The Pavilion has two of its "legs" immersed in water. This can be understood as a means to personify an image of the ancient sages who would seek to cool off during the summer by dipping their feet into a mountain stream's cool waters. Usually ponds were created based on the notion of *Cheon-won-ji-bang*, under which it is thought that "the sky is round and the earth is square," and the relationship of water and fish that is often compared to that of the king and his subjects. These design considerations were related to scientific principles that allowed the water to circulate and not stagnate. But this pond is irregular shape followed the natural topography.

Regarding this relationship between the nature and human beings, there is a beautiful poem written by a 16th Century scholar poet, *Song Sun* (1493-1583): [7]

-ten years-
It took ten years to build
My little thatched hut.

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[7] This poem is one of the good examples to show the notions of understanding the relationship between nature and human beings in terms of Korean traditional architecture. After the poet Song Sun retired from his long-term position as a government official, he built a humble three room pavilion on a hill above his home village. He took such a long time to finish the construction. Such a long time described as "ten years" in the poem. He shared the pavilion together with fresh wind and warmish moonlight. The three-room hut was too small to let the mountains and streams in. Thus he shall leave them around the hut and appreciate it as it is.

One part is for me, the moon fills the second,
The third is reserved for the clear wind.
Rivers and mountains: There is no room to invite you in!
Stay where you are, I'll gaze at you surrounding me.
(Translated by *CHO In-Souk* and
edited by Prof. Dr. *Young-Key Kim-Renaud*)

Conclusion

This suggests a further consideration on authenticity, integrity of the architectural heritage in the rapid changing Metropolitan City of Seoul as resources for the continuity of architectural heritage.

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Fig.3 - The Residence of *HAN Gyu-Seol*

POST-DISASTER NEEDS ASSESSMENT IN VANUATU AFTER CYCLONE PAM

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Abstract

Cyclone Pam hit Vanuatu in March, 2015 and the PDNA conducted by UNESCO and the World Bank estimated that $268.4 million would be needed for recovery and rehabilitation. During the height of the storm winds reached 250 km per hour and 90% of buildings were damaged or destroyed.

Buildings and structures comprise historically significant and vernacular western buildings and traditional nakamals (huts). Traditional nakamals are constructed using techniques which have intangible cultural heritage significance. Analysis of the structures found that they were very strong and able to withstand the force of cyclones but when combined with western techniques they fail. However, there is little analysis which demonstrates how traditional techniques actually work.

Western buildings are original colonial pre-fabricated or vernacular timber – framed and some concrete buildings. Western dwellings and village structures are built by the people using often recycled or below-standard materials and that standard building practice is often overlooked. Therefore the ability to withstand cyclones is limited.

Colonial and government structures fared better due to better building practice and materials.

The PDNA survey provided a valuable opportunity to undertake further research. While measurements and photos were taken, and sketches made, it would have been useful to have some portable, solar-powered recording and GIS kit which would enable later desktop study of structures and objects found. A comprehensive Blue Shield four-pillar approach would have been also beneficial. This paper will develop these aspects and make some recommendations for approaches to future PDNAs.

Key words: Cyclone Pam, Vanuatu, Nakamal, Intangible heritage, Traditional knowledge, Colonial buildings. (max 6)

Background

The peoples of Vanuatu have been dealing with a changing environment and history for centuries. Adaptation to change is part of their lifestyle and traditional knowledge, skills and practices; and their tangible and intangible cultural heritage underpins the ability of communities to successfully live and thrive in the environment. Cyclone Pam (Category 5) made a direct hit on the Republic of Vanuatu on 13 March, 2015. It proved to be be one of the worst natural disasters in the island chain's history. The Post Disaster Needs Assessment (PDNA) for culture and heritage focussed on selected nakamals and western style buildings of historical significance, incuding former residences, churches and an archaeological site.
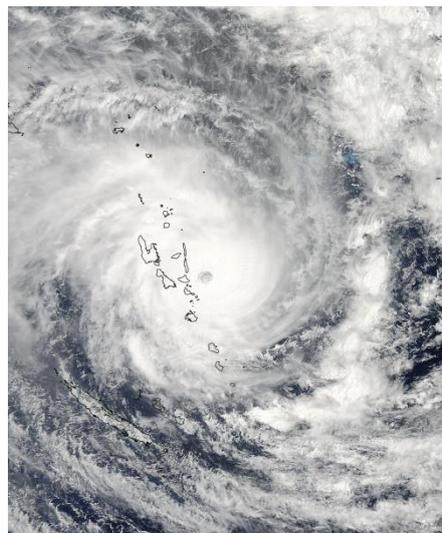
Nakamals

The performance of traditional structures (nakamals) during Tropical Cyclone Pam demonstrates how traditional knowledge is practiced and why it remains relevant. Notwithstanding, some were damaged but were repairable.

Indigenous architecture in Vanuatu is represented by the traditional nakamal. The nakamal, or farea, is a significant traditional community shelter dating back several centuries. Traditionally a nakamal would have been found in every village and over time, traditional knowledge-based skills have adapted this typology to resist environmental hazards including cyclones. The style, shape, orientation and detailing of nakamals are distinct and differ throughout the islands and communities of Vanuatu. Nakamal typology uses local materials which are grown or found, so large community buildings can be constructed traditionally and economically. Vanuatu is heavily vegetated and vegetable fibres (wood, bamboo, sago palm leaves, pandanus and sugar cane) were commonly used in the construction of nakamals. Some traditional structures were constructed to withstand cyclones. Since European contact, resettlement and the introduction of western materials (nails, dressed timber and corrugated iron), the prevalence and quality of nakamal construction has diminished. Modern rigid materials often of inferior quality are mistakenly used instead of traditional flexible ones and many communities have no access to new or quality building materials, nor the ability to purchase them.

Fig.**2** – *Vanuatu, Port Villa, Chief Nakamal, Parliament building at the capitol of Port Villa. Before and after Cyclone Pam. The roof and walls made of woven mats were blown away by cyclonic winds, but the main*

The Chief's Nakamal in Port Vila, the capital, is a national treasure and a significant cultural icon.   It sustained significant damage to its thatched roof and woven bamboo walling caused by windborne impact, while the lightweight materials and flexible framing enabled the actual structure to survive the cyclone.   The 25 metres long ridge of the thatched roof of the Tikilasoa Farea (Nguna Island) was damaged by strong winds, causing water ingress.   The roof of the women's space was blown out and its wooden structure was exposed.   Several local nakamals are used as community refuges during storms or cyclones.   They play an important role in DRR because they may be the only place of shelter and refuge.

Fig.3   – The Tikilasoe Farea, Taloa village in Nguna Island was used as a village community shelter during the Cyclone.   Constructed from traditional methods and materials it suffered little damage except for the women's corner where part of the roof was torn off.   Photographer: Kanefusa Masuda.   © Vanuatu Cultural Centre.

Fig. 4 - This community nakamal at Hotspring Village, Efate Island, collapsed because a rigid modern dressed timber truss structure and steel nailswere

To enable restoration and the preparation of a Disaster Risk Reduction (DRR) strategy the damaged nakamals need to be properly documented and the traditional building skills and knowledge associated with social rituals and traditional craftsmanship also need to be preserved and taught as part of living heritage.

In relation to the recovery strategy and needs, the short-term strategy was the restoration of the Chief's Nakamal as a priority and an iconic opportunity for collaboration and encouragement to those affected communities and economic recovery through employment generation. Beyond that the medium - to - long term strategy was that once the condition of the affected nakamals and stories during the cyclone were documented, the priority would then be to recommend the best safeguarding measures which likely would include re-planting of trees; recording and teaching of traditional building construction skills and the processes of procuring traditional building materials; youth training; development of a DRR strategy for the nakamals and potential sourcing of funding for the reconstruction effort. 'Build Back Better' strategies were recommended to be implemented combining best practice traditional knowledge with contemporary knowledge. Capacity building training courses for the revitalisation of traditional craft skills such as weaving were recommended to be organised to train trainers from other islands who would share what they had learned with other women and men at villages.   A strategic review of the CRMD management plan was recommended to incorporate a DRR strategy by documenting traditional community strategies for disaster management including responses to cyclones.

Western Style Historic Buildings and Churches

In Port Vila 17 places of cultural and cultural heritage significance, registered in the National Registry managed by Vanuatu Cultural Centre, were surveyed for the PDNA. They included churches, former colonial residences, an archway, public library and art galleries. Nearly all places variously have aesthetic, historical, technological or social significance and are tangible links with themes and phases in Vanuatu's history and culture, including World War II; the export of prefabricated buildings from Britain to the colonies, including to Australia; Christianity brought by missionaries; south-seas trading and British and French colonisation. Two places support the arts

and crafts industry which is a significant income stream in the Vanuatu economy.

Fig. 5 Even though the colonial buildings were comparatively old, because they were sturdily built in the first place and had been mainatined subsequently, they suffered usually only minor damage. Photographer:Robyn Riddett.

The colonial buildings were well-built originally but over time maintenance had been deficient. Some churches had been constructed using typical western methods and materials and these sustained less

damage whereas others had been constructed more cheaply and employed cement sheet and similar materials for cladding. Privately-owned post-colonial dwellings are generally more flimsy and are comprised mostly of second-hand materials. Damage sustained by the Port Vila heritage buildings was assessed as not significant and all of the buildings were soon re-occupied, even though damaged, and were capable of repair and did not need to be demolished. Importantly the PDNA assessment survey identified that, apart from direct damage from rain, wind and wind-borne debris, a significant underlying factor which made these buildings more vulnerable was the method and type of construction which was not in accord with any building code although one exists; a widespread poor maintenance regime (corrosion, rot, probable termites); second hand and/or stress-grade timber unsuitable for the structural purpose and which caused structural failure and which would affect the approach to repairs; lack of appropriate roof bracing; lack of eaves gutters and attention to rainwater and the probable use of fibro cement sheet containing asbestos. There was a general lack of awareness of the hazards of asbestos.

While there was some evidence of roof bracing and stronger framing being included in new structures and repairs this was not uniform or mandatory. Also there were no conservation policies or methodologies and the rebuilding activity offered

opportunities to rebuild elements in a new style instead of salvaging original materials and re-using and/or replicating them. Thus the original appearance of some buildings was compromised through inappropriate reconstruction. In 'Building Back Better' the future the approach should be to rectify these shortcomings and to have regard to current standards for building in cyclone-affected areas and current building and housing codes. Where they are not current they should be updated using appropriate models (Australia, New Zealand) and adapted as required for Vanuatu. Conservation management plans or widely applicable guidelines need to be prepared to ensure that future repairs maintain the cultural heritage significance of the design and fabric of importnat structures. Importantly the PDNA assessment survey also captured new historical and architectural data and information which was very useful to update the National Registry.

Technology in the Field

The post-disaster fieldwork was conducted using local knowledge to find the location of the relevant structure but sometimes this was not accurate and it took some time to actually locate the correct nakamal or building. A GPS device or map app in a mobile phone would have been helpful. In post-disaster conditions and in areas where there was no power, recording was done with a digital camera, sketches, tape measures and handwritten notes. For future PDNAs or other fieldwork in difficult or remote conditions, it would be useful to have a backpack kit which is independently or solar-powered and which would bring modern technology to the fore and which would assist with subsequent reporting and research, The expertise of CIPA, ICORP and ISCARSAH would be valuable in developing such a kit.

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Fig.3 The Tikilasoe Farea, Taloa village in Nguna Island.

Fig.4 This community nakamal at Hotspring Village, Efate Island.

Fig.5 The colonial building suffered reletaively littl;e damage even though they are old.

COLLABORATIVE INTEGRATED KNOWLEDGE MANAGEMENT SYSTEM FOR HERITAGE STRUCTURES

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Abstract

Ancient rich architectural and cultural heritage is at risk, especially in developing countries, due to effects of aging, rapid urbanization, disasters (e.g. earthquakes, floods, fires, terrorism). Recent earthquakes in areas with heritage structures include Nepal, Myanmar, Japan, Italy, Ecuador, New Zealand, Haiti, and India. Massive amounts of data are collected after such events from field reconnaissance, GPS, Remote Sensing and Satellite technologies. There is a need to turn this large volume of data into useful knowledge so that we can extract lessons of how hazardous events affect heritage structures and determine priorities for resource allocation and planning for the mitigation against future events.

This paper presents an Ontology-based integrated environment for managing knowledge of heritage structures within the context of hazardous events. The ontology describes the areas of heritage structures, hazardous events, regulations and mitigation efforts and solutions. Data to populate the ontology come from many publicly available databases as well as case descriptions of specific events or restoration projects.

The integrated system uses the ontology as an information processing environment and includes a set of intelligent agents that interpret the data into higher level knowledge in the form of rules and lessons learned. It can apply the collected

knowledge to the cases at hand and offer insights towards mitigation measures and solutions.

This system will help formalize the body of knowledge in the area of risk management for heritage structure and make it possible to share that knowledge across all the areas that are subject to hazardous events, especially in developing countries.

Keywords: Knowledge management, collaborative systems, heritage structures, risk mitigation

Introduction

The paper presents an overview of a proposed integrated and collaborative knowledge management system for heritage structures. The unprecedented devastation that the world has seen unleashed by natural disasters e.g. earthquakes in Haiti, New Zealand, Japan, Italy, Nepal, Ecuador, Myanmar, and very recently in Mexico among others, has severely impacted the developing countries over the recent past. Furthermore, the scope and scale of the devastation caused not only by earthquakes but also by torrential rains and floods brought on by effects of climate change, e.g. hyper monsoons of 2014 in Uttarakhand, India; recent devastating hurricane Harvey in Texas, hurricane Irma in Florida and the catastrophic Hurricane Maria that devastated Puerto Rico recently, among other such disasters around the globe, point to the vulnerabilities faced not only by developed countries, but also by developing countries to such catastrophic events. The significant losses and damage suffered by precious cultural heritage and heritage structures during these devastating disasters is an issue of urgent interest not only in developing countries but around the world at large.

Over the past several decades, field reconnaissance of cultural heritage damaged sites, for post-earthquake assessment and reconstruction, has resulted in accumulation of collected observed damage data about performance of cultural heritage structures from earthquakes in Italy, Turkey, Nepal, Japan, Myanmar, Ecuador, among many others. Furthermore, recent advances in GPS, remote sensing, 3D scanning and satellite technologies have accelerated the ability to collect field reconnaissance damage data from cultural heritage sites in the aftermath of catastrophic earthquakes, hurricanes, floods, and other disasters. The resulting substantial knowledge base of earthquake damage data provides unique opportunities to derive lessons therefrom, to help prepare for likely future disasters, improve codes, guidelines and practices for restoration and preservation of heritage structures.

A proposed database approach to integrate multiple earthquake data sources into a contextual ontology to support the earthquake hazard assessment and seismic retrofit of buildings was presented by Rihal and Assal (2012). A proposed intelligent platform for integrating information from different sources and tools to assist in the assessment of seismic hazard mitigation of heritage structures in New Delhi was presented by Rihal and Assal (2016).

Heritage Structures At Risk

Our precious architectural heritage is at risk from effects of aging, fast and unregulated growth and urbanization, disasters e.g. earthquakes, terrorism, floods; natural deterioration, environmental factors, lack of adequate conservation programs and general apathy.

The recent catastrophic earthquakes in Italy, Nepal, Myanmar, Ecuador, Mexico, Japan among others provide clear evidence of the powerful impact of the damage and resulting losses of precious cultural heritage especially in developing countries e.g. Nepal, Myanmar, Ecuador, Philippines, Mexico etc. Earthquakes in many cases have been found to have been followed by further devastation caused by landslides, soil liquefaction, tsunami, and fires. The experience during these developing, as well as developed, countries shows that in addition to loss of human lives, and their precious cultural and architectural heritage, the economies of these countries are severely impacted due to losses in tourism to the affected beautiful heritage sites.

Especially noteworthy are the efforts by organizations such as CyArk (Jayaram 2013), for application of modern 3D laser scanning and photogrammetry technologies for helping conserve the heritage structures damaged by natural disasters around the globe.

Hazard and Risk Mitigation Efforts

Heritage structures are symbols of a nation's culture and heritage. Now there appears to be increased awareness of the value of protecting precious cultural and architectural heritage in countries around the globe for future generations. The challenges that developing countries face is the ongoing struggle between allocation of resources for economic growth vs. conservation and protection of cultural and architectural heritage. Study of the Risk Mitigation Efforts in developing countries e.g. India, Nepal, Myanmar, and neighbouring countries in the south Asia region, Philippines, Turkey, among others, shows that such efforts definitely help protect and preserve our precious cultural and architectural heritage for benefit of future generations. As an example, a methodology for seismic risk assessment of heritage buildings in Iloilo City, Philippines has been presented by Yu and Oreta (2014). The proposed risk assessment methodology provides a basis for prioritizing the heritage buildings that need further investigations and develop retrofit plans based on their cultural values and risk levels.

The cultural heritage buildings in the Iloilo city were ranked for their preservation based on the identification of their critical seismic parameters. The contributions of international organizations such as the UNESCO, World Monument Fund, Agha Khan Trust for Culture, among others are especially noteworthy for hazard and risk mitigation, protection and preservation of cultural heritage structures e.g. in India, Nepal, Myanmar, Afghanistan, and other developing countries. It is now becoming evident that modern technology can play a significant and important role in helping document, assess and conserve cultural heritage that is being lost due to multitude of hazards outlined above.

The Proposed System

There are many data sources that can provide some useful information in different aspects of the hazard and risk mitigation efforts. For example, the United Nations Education, Science and Culture Organization (UNESCO) maintains a database on world heritage, which includes information on many historical structures and their current conditions. The Agha Khan Trust for Culture holds another database with similar information with a focus on revitalization of communities in many aspects.

We propose the integration of many available databases in an ontology-based environment, in which all the information processing and reasoning will take place. The ontology models the knowledge of heritage preservation, structures and the types of hazardous events and is populated by information from the different databases that are integrated in the system. Figure 1 shows the different components of the system and the relationships among them.

The system consists of:

The extraction layer, which connects to existing databases and extracts the needed information into the ontology. The extraction layer performs transformation of the data into the format that is suitable for populating the ontology. It also offers other data services, such as data cleansing, validation and a limited level of data correction. Most databases have missing data in some fields or some records, which may affect the overall picture, which the ontology is trying to build. Data cleansing and validation services identify such records and makes an effort to fill-in the missing data, either from other sources with similar information, or according to some inference rules that define the relationship between the different fields or records. Data records that cannot be cleansed or validated may be removed or marked as 'incomplete.'

The information model (i.e. the ontology), which is the structure of knowledge as described above. The ontology offers reasoning capabilities based on the logical structures that are used to represent the domain objects and their relationships. The next section addresses the development of the ontology in more details.

The ontology component is the logical environment that houses the intelligent agents, which are the components that perform the intelligent analysis of the current state of the system. The agents monitor the state of the system continuously and react automatically to any change in the state. Multiple agents can be developed independently, with each agent focusing on a specific aspect of risk management effort. For example, one agent can look for potential damage to a given structure due to an anticipated hazardous event and recommend a mitigation measure to reduce damage. Another agent can look at a restoration project on a given site and recommend plans for performing specific tasks of the restoration project. This is possible because the needed information is all contained within the same ontology and connected to provide a context for this level of analysis. Interaction among agents can take place within the ontology environment, where changes made by one agent can be visible by other agents. An example of such agents is the practical expert system for safety evaluation of existing structures, which has been presented by J. T. P. Yao (1984)

The data access layer provides a mechanism for navigating the ontology and accessing information based on predefined interests. This layer allows different types of users to define the perspective of the ontology that best serves their specific needs. A perspective is a subset of the ontology organized according to the users required view. Data access tools can be developed separately and plugged into the system to allow for new perspectives as new projects emerge. Other data access tools can help the user develop scenarios, where the data is provided in specified sequence and time frames.

Data consumers are users or other systems that can connect to this system and request information using the data access layer and its tools.
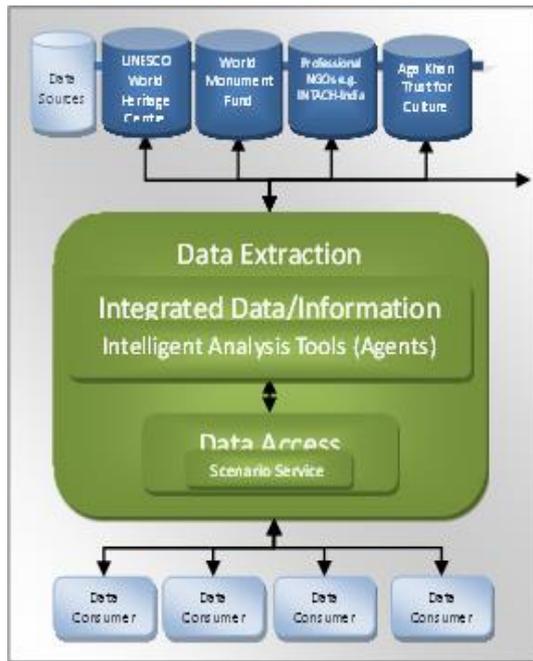
Figure 2. System architecture   Figure 3. Sample ontology for earthquake related knowledge.
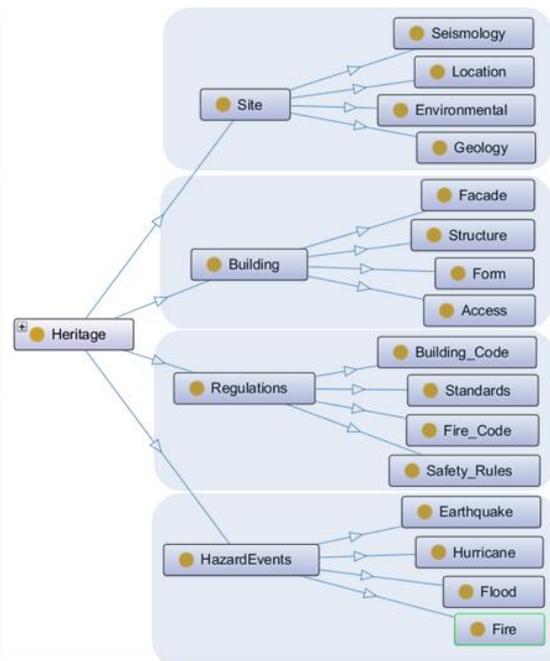
Development of The Ontology

An ontology is a structure of knowledge in a domain, which captures the significant objects in the domain and the relationships that connect objects. It provides a perspective for understanding the domain and explore multiple views of how objects in the domain may behave. An ontology is structured in a logical way, which provides the opportunity to perform reasoning on the existing objects and produce more knowledge out of the existing objects and relationships. The reasoning capabilities of an ontology allow for intelligent agents to perform high level tasks of examining the environment and suggesting actions that are appropriate to the current state of objects.

The development of the proposed ontology focuses on four areas:

Heritage structures. This section of the ontology addresses the structures and their significant components. It describes the structures as they are built and notes any special features which represent the value of that structure. This information can be represented in a manner that is consistent with the standard Building Information Models (BIM) and can be obtained from documented building descriptions, and field surveys of structures after significant events.

Site information. This section describes the nature of historical sites, such as the climate, soil conditions, existing structures on the site and their relationships, etc. This

information can be obtained from site documentation and any existing restoration projects.

Hazard events. This section describes the different types of events, such as earthquakes, floods, fires, man-made disasters. It defines the magnitude of each event and the possible damage it may cause to sites and structures on sites. This information can be obtained from hazardous event databases that are typically maintained by government agencies and made publicly available.

Regulations and Mitigation solutions. This section describes the existing regulations in any region with heritage structures, which define access to sites and structures and types of allowable actions in dealing with heritage issues. Mitigation solutions can be collected as they develop in response to specific site needs.

Figure 2 shows a skeleton ontology including the four sections above. Each section can be developed separately and connected to the main ontology as needed. The modularity of the ontology offers the opportunity for expanding the ontology later with more details as new knowledge is developed or case studies are provided.

Benefits and types of users.

The use of ontology in the integrated system provides a wider context for users to perform more meaningful analysis. The integration of structural information, damage information, ground motion, regulations, and other types of knowledge makes it possible to consider higher level issues in dealing with preservation, restoration or risk mitigation issues

The integrated system can be used by many types of users for different purposes. Designers, architects and engineers can benefit from building type information and knowledge of regulations to produce a plan for assessing a given heritage structure. Restoration efforts rely on such plans for making decision about priorities of work and estimates of cost.

Planners, building officials and policy makers can use the system to examine existing policies, and develop more effective and responsive policies and hazard mitigation plans for heritage structures.

Government agencies and organizations benefit by having an access to a bigger picture of any given hazardous event and its impact on its affected areas. This view

allows for a more efficient resources allocation to preservation efforts.

Archaeologists benefit by having an integrated access to a holistic picture of heritage monuments in a given area and develop improved and more effective plans for protecting and restoration of heritage monuments in hazard prone areas. They can also access detailed models of structures, which may be difficult to reach or at risk of further damage because of exploration efforts.

Researchers benefit from the proposed system by having ready access to integrated information about heritage structures, including the site effects, building information, codes and regulations, and effects of hazards. The integrated environment allows researchers to navigate the existing information and gain insight of the effect of the different events on heritage structures.

Conclusion

We presented an integrated knowledge-based system to support the efforts of heritage structures preservation and risk mitigation. The system is based on an ontology, which includes knowledge about building information, site information, hazardous event information and regulations related to heritage structures. The ontology is populated with data drawn from available databases and is updated periodically. The system is designed to provide access to many types of users with different perspectives and different needs. The system is modular, allowing the inclusion of additional external databases and the definition of new perspectives for more types of users. Access to the information in the system can be tailored to the needs of each user type and can be updated as needed.

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IMPACT OF WORLD HERITAGE INSCRIPTION ON LOCAL SOCIETIES

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Abstract

The paper discusses impact of the inscription on World Heritage (WH) list to local societies. It is generally believed that the WH inscription provides numerous benefits with local societies including economic one. Nonetheless, it is also true that WH sites may have negative influence on them like unequal increase of tourist-related traffics. In the present research, two case study objectives are considered. They are chosen from WH sites in Nepal and Japan. Nepal is a country between China and India. It shows very peculiar culture of fusion of Buddhism and Hinduism. Nepal somehow maintains its medieval social system today and monuments are very close to their daily life. A WH site, the Kathmandu valley is discussed. The valley includes three major Nepalese cities: Bhaktapur, Kathmandu and Patan. In contrast with Nepal, Japan has lost traditions and cultures considerably especially during the economic development after the World War II. Two WH sites, a mountain village, Mt. Fuji and monuments are discussed. In this paper, by reviewing and comparing WH sites in the two countries, impact of WH inscription on the local societies is discussed.

Key words: Conservation, Heritage management, Heritage values, World Heritage Sites

Introduction

After the World War I, UNESCO was established in accordance with the born of League of Nations. In 1960s, UNESCO launched a project to protect the Abu Simbel Temples which was going to be destroyed for the construction of the new Aswan Dam.

It was considered a pilot project for the creation of the WH convention by the international community which was represented by UNESCO. The Convention was adopted in 1972 and became effective in 1975. The WH Committee was formed for the management and implementation of the convention. The first inscription of WH Sites was had at the second meeting of the WH Committee in 1978. At the meeting, eight cultural sites and four natural sites were designated. At present (August 2017), There are 1,03 WH sites from 167 countries in the world (UNESCO WHC 2017).

The present paper discusses monuments in Nepal and Japan from various viewpoints. Historic England (2008) states that monuments are composed of evidential, historical, aesthetic and communal value. The evidential value denotes the potential of a place to provide evidence about past human activity. The historical value is concerned with the possibility that a place connects past people, events and aspects of life to the present. In many cases, it is illustrative or associative. The aesthetic value is the capacity that a place provides sensory and intellectual stimulation with people. The communal value is the meanings of a place for the people who are relevant to it, or with whom it provides their collective experience or memory. In the present paper, monuments in the two countries are assessed, taking into account the above-mentioned four values. The aim of the paper is to indicate the impact of WH inscription to local societies.

Introduction to case study countries

The kingdom of Nepal exists at least for 1,500 years (Savada 1993: 15). During this period, the Kathmandu Valley has played a principal role in political, economic, and cultural terms. People of the valley have developed peculiar Southern Asian civilisation, transmitting the culture from both north and south. It can be said that they have created unique culture on the basis of Buddhism and Hinduism as well as the cultures of local Newar citizens and neighbouring Tibetans including architecture. There was the era of Licchavi (the 4th to 8th century) and Malla (the 12th to 18th century). During that time, nonetheless, those kings' influence was limited within the Kathmandu valley. During the latter half of the Malla dynasty, the Kathmandu valley was divided into three kingdoms (today's Bhaktapur, Kathmandu, Patan) (Strestha and Singh 1972: 29). There were also many small kingdoms around the valley at that time. In the late 18th century, the destiny of Gorkha, one of these small kingdoms, conquered its neighbouring kingdoms and finally united one nation. While the rest of the world went through modernisation, in Nepal the panchayat system remained. Nepal became a democracy country in 1991. In Nepal, there are two cultural WHs and

two natural WHs. The Kathmandu valley was inscribed on the WH list in 1979 as it represents peculiar traditional civilisation of Newars. The valley includes three major cities: Bhaktapur, Kathmandu and Patan. Two strong earthquakes hit Nepal in 2015. It is named the April 2015 Nepal earthquake and the May 2015 Nepal earthquake. Many historical structures was seriously damaged or even collapsed after the earthquake. Currently, they are under investigation and reconstruction with economic and technical aids from various national and international organisations.

In Japan, in early days a large scale of settlements did not exist due to the agricultural-dependent life style in addition to the smallness of the land. Those settlements did not consist of more than one family. The capital existed since more than 1,500 years ago. However, at that moment it just meant a symbolic centre of the clan associations. Since the 7th century, the capital functioned as an administrative centre. In 689 the first actual capital was built in Nara. Then the capital moved around in Western Japan several times during a short period and it was settled in Kyoto in 794. By the beginning of 12th century, the military started to hold the power. The centre of the administration and economics was built in Kamakura in 1192. However, before too long, the Warring-States period started in Japan. In 1600 finally it was settled and the new actual capital was established in Tokyo. However, the Emperor still resided in Kyoto, which meant officially the Japanese capital was still Kyoto. Then in 1868, the then Emperor moved to Tokyo as well so Tokyo became capital in name and in reality from then onwards. Tokyo was originally established as a tiny castle town and was positioned at the top of bay so as to control both land and costal traffic. However, by the early 17th century, Tokyo was one of the largest cities in the world. Today in Tokyo the most of the historical buildings are replaced with the modern ones, but still the street patterns is more or less the same as used to be. The presented summary is on the basis of the book of Yazaki (1968), Masuda (1970), Morris (1994).   In Japan, today there are 17 cultural WHs and four natural WHs.

Examples of WH sites in Nepal

In Bhaktapur, two buildings are reviewed. They are the peacock-window palace (Pujari Math) and Nyatapola temple. Pujari Math is situated in the historic centre of Bhaktapur. It was built by the King Yaksha Malla in the 15th century (Amatya 1988: 1). The building is well-known for the peacock-carved window. The carvings in the building, including the peacock window, are considered a masterpiece of Newar craftsmanship (Kunwar and Chand 2016: 19). The building is situated next to the

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Durbar square. It was used as a museum till the 2015 earthquake occurred. However, it is temporarily closed for the restoration due to the damage after the earthquake. Since it is located in the middle of the historic centre Taumadhi square, it is passed frequently by tourists as well as local people. Considering the four values discussed in Section 1, since it has been converted to a museum, the evidential and historical values have been harmed. On the other hand, its original form maintains the aesthetic value. The communal value is deteriorated slightly. Nyatapola temple is a five-storey pagoda (Fig.1a). It is located in the historic centre of Bhaktapur. The temple was constructed by the King Bhupatindra Malla in 1702 (Strestha and Singh 1972: 68). It is one of the tallest temples in Nepal. The temple is considered a landmark of the Bhaktapur city and it is used as a logo of the Bhaktapur city council. It is all the time crowded with local people and tourists around the temple (Fig.1b). It can be said that Nyatapola temple holds the four values in a very good condition. Kunwar and Chand (2016: 20) mentioned that Bhaktapur is a living cultural heritage, meaning that the culture and traditions are still alive everywhere in the city.
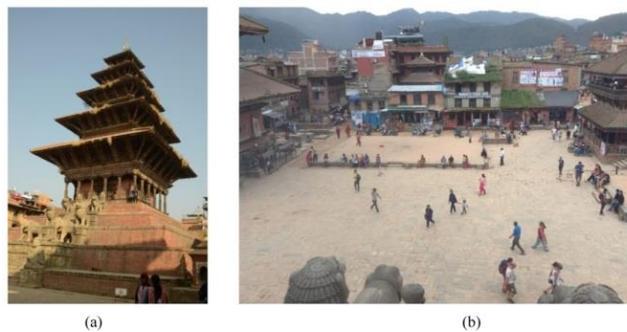
Fig. 1 – Nyatapola temple (a) and view of the Taumadhi square from the top plinth (b).

In Patan, two religious buildings are discussed. They are Kumbeshwar temple and Radha Krishna temple. Kumbeshwar temple is a five-storey pagoda situated in the historic centre of Patan. The top tier was collapsed after the April 2015 Nepal earthquake. The site consists of various temples, which makes the site a complex of Hindu temples. The temple was constructed by the King Jayasthiti Malla at the end of 14th century (Strestha and Singh 1972: 27). Originally it was a two-storey temple. It was once lost and rebuilt as a five-storey temple by Srinivas Malla in the middle of 17th of century. The temple is known for carvings dedicated to a Hindu God, Shiva. Many local people visit the site of Kumbeshwar temple various times a day, as it is composed of different important temple including Kumbeshwar temple. It can be said that the temple is part of their daily life. The temple shows incomparable features by the timber carvings. Its historical authenticity has been mentioned above. It can be

said that the Kumbeshwar temple maintains intactly the four values discussed in Section 1.

Radha Krishna temple is a three-tier pagoda in Patan (Fig.2a). It is said that the temple was constructed by a clan of Raghu Vamsi at the end of the 17th century or Kirti Simha, a minister of King Srinivasa Malla in the middle of the 17th century (Gutschow 2011: 478). The temple sits on a tall plinth composed of three platforms. It is located in the historic centre of Patan, Swotha square. The temple was totally collapsed during the 2015 Nepal earthquake (Fig.2b). In the square, there is another pagoda, Krishna Mandir temple. Evident damage is not seen in that temple unlike Radha Krishna temple.

Fig. 2 – Radha Krishna temple: before the 2015 earthquake (a) and after (b) (a from KVPT).

Radha Krishna temple was situated at the crossing of two busy streets. It sat on a high tall plinth. Local people still gathers around the plinth which survived the earthquakes of 2015. It seems the temple worked as an important communication point. Taking advantage of it, the discussed temples in Patan held significant evidential, historical, aesthetic, communal value although currently the temple does not exist due to the earthquake. Thathang (2005: 94-96) demonstrated the increase of tourists (excluding trekkers and mountaineers) by three times from 1980 to 2000. Considering that the valley was inscribed on the WH list in 1979, this result would indicate economic benefit given by the WH inscription of the valley. Nonetheless, Chan and Bhatta (2013: 71) indicated lack of planning control of tourism, which results in pollution and waste increase in Nepal and suggested cooperation between tourism industry, local communities, and governmental institutions.

Examples of WH sites in japan

In Japan, two WH sites, Mt Fuji and Shirakawago are discussed. Mt. Fuji was

inscribed on the list in 2013. Many pieces of art including painting have been produced using Mt. Fuji as a motif. One of the most internationally recognised examples would be paintings by Hokusai including The Great Wave of Kanazawa. It can be said that Mt. Fuji is considered a landmark in Japan. Mt. Fuji has played a major role as the subject of pilgrims and inspiration of artists (UNESCO WHC 2017). It became a centre for the training of Buddhists in the 12th century. Today the mountain receives large number of domestic and international visitors. Since it was inscribed just a few years ago, not so much feedback has been reported regarding the influence of the inscription. KOKFD (2015: 1) reported that that the number of visitors was increased by 13.5 % in 2013 after the inscription. Fukuto (2005: 10) mentioned that the WH inscription does not necessarily promise economic benefits especially in case the inscribed monument is already nationally and/or internationally recognised. It can be said that Mt. Fuji keeps good quality in terms of the four criteria presented in Section 1. However, it has to be mentioned that the WH inscription have caused strong economic impacts to the site. On the sacred path, a considerable number of guesthouses and shop are going to be built. This may harm the aesthetic value of the site if it is not carefully conducted.

A mountain village Shirakawago is located in the middle of Japan. It used to be sericultural settlement in a mountain. It was inscribed on the WH list in 1995. Houses in the village possess a very authentic peculiar steep roof against heavy snow in the winter (Fig.3). Before the inscription, the village was nearly abandoned due to not only the decline of the sericultural industry in Japan but the inaccessibility to the village (Yano 2006: 41).

Fig. 3 – Shirakawago (Shirakawa village office).

Benefits and inconveniences derived from the WH inscription for Shirakawago. Around 1,800,000 people in average visited the village in 2016 (Shirakawa village office). In 1994, before the WH inscription, the number of visitors was 89,000. After

the inscription, the number was doubled. It surely provided economic benefit for the village. On the other hand, it has to be noted the population of the village is about 2,000 in 2016. Incompatible amount of tourists causes traffic jam and garbage issue. The increase of tourists also has a negative impact on peculiar townscape composed of the farmhouses and farmlands due to restaurants and saviour shops for tourists (Nishimura 2008: 8-13). Considering the criteria presented in Section 1. Since the sericultural industry is not active in the village, it could be said that the evidential value is not intact. For the same reason, the historical and communal value is also lost a little. Nonetheless, the village keeps the original form in terms of the village form and each sericultural house, the aesthetic value remains intact.

Conclusions

The paper discussed impact of WH sites to local societies. It can be said that Nepal is a very intriguing case. The country remained a medieval society through the conflict between China and India. Both life and architectural styles are peculiar mixture of both cultures. On the other hand, Japan struggles between the economic development and protection of monuments.

- Evaluation of monuments

In the present paper, monuments were assessed taking into account the evidential, historical, aesthetic and communal value. This permitted appropriately close observation of the discussed monuments. In case of Nepal, the presented examples showed four values were maintained. In case of Japan, Shirakawago indicated that the evidential and historical values have been lost to some extent.

- Difference of the two countries in economic and social situations

One of the major differences between the discussed two countries lies in economic and social situations. In Nepal, the examples indicated that monuments are considered part of the life to local societies. Temples including the presented ones are visited by local people frequently. In many developed countries including Japan, it is not unusual that monuments have lost their original functions and are converted into a new function.

- Benefits and drawbacks of the WH inscription

Both case studies have shown certain economic benefits provided by WH inscription. Nonetheless, both cases showed certain drawbacks derived from the inscription such

as increase of traffics and waste. For instance, Arai (2008: 53) mentioned that the increase of tourists due to the inscription caused obstruction to the local community.

- Future possibility of WH sites

The comparison of the examples of the two countries provided an insight for the future management of WH sites. Nevertheless, both cases imply significance of protection of monuments. Historic Environment Scotland (2017) states that the inscription permits identification of the most important parts of the heritage and its protection for future generations.

Acknowledgements

Biography

The author is an expert member of ISCARSAH since 2017. B.Arch, Kyoto University, Japan, 2005. MSc in European Urban Conservaton, Dundee University, the UK, 2009. MSc in Structural Analysis of Historical Constructions, Padova University, Italy, 2009. PhD in construction engineering, UPC, Spain 2015. Assistant professsot at the department of architecture, Shinshu University, Japan since 2016.

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Fig. 3 – Shirakawago (Shirakawa village office).

ASSESSMENT ON THE ISSUES TO THREATEN CULTURAL ASSETS THROUGH RISK ANALYSIS: ON THE BASIC OF FIRE OF ISTANBUL HAYDARPAŞA TERMINAL IN 2010

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Abstract

Cultural assets of a society have a significant role to transfer many scientific, religious, cultural, aesthetic tangible and intangible values between the generations as a heritage. Threat risks endanger mainly these values to increase the importance of cultural asset. Risk management is a fundamental phase to prevent the destruction or loss of cultural asset in value. Identification of natural or human origin threat factors, having impacts to damage or destroy the values of cultural asset; observation and evaluation of characteristics such as their influences to the values as well as the spheres of influence are significant steps to be taken in order to prevent this process.

Reviewing the fire disaster in 2010 regarding Haydarpaşa Terminal, which is discretely and perceptibly one of the major cultural assets in Turkey, the objective of this study is to determine the factors likely to threat the building currently, and contribute to sustainability of the cultural structure thereby conducting analyses to restrain such threatening factors in order to avoid the risks likely to take place in the future.

In line with this objective, case history of the building was studied, the fire in 2010 was examined, current risks were revealed, and the method to determine the degree of influence of risk analysis method and elements of risk to the buildings was explained. In the conclusion party; degree of threat of the elements of risk to the structure were determined and a risk map was created following the assessment on elements of risk through risk analysis method and suggestions were made in order to safeguard the building against potential risks.

Key words: Cultural Heritage, Sustainability, Risk Analysis, Haydarpaşa Terminal

Introduction

Within the history of civilization for thousands of years since from the beginning of the humankind up until now, the values that human beings created themselves or with the help of the nature, are called "cultural and natural heritage" today.

<<There are many ways to classify elements that threaten cultural assets. The elements threatening cultural assets are basically divided into two according to their source as natural conditions and human-caused destructions>>[8].

Preservation, retention against natural and human-caused threats of the tangible and non-tangible cultural values that constitute cultural assets and transferring them to the next generations are important in terms of keeping these structures sustained.

<<Just as the Heritage at Risk series, which has been published by ICOMOS since 2000, demonstrates, cultural assets are facing the threat of extinction simultaneously and in many places around the world>>[9].

<<With many natural disasters such as earthquakes, floods, landslides and; many human-induced threats, such as political tensions, wars and vandalism, either destruct cultural assets or confront them with therisk of destruction>> [10].

Starting with identifying these threats and the possible risks they create, risk management sheds light to the kinds of interventions necessary to protect cultural values by conducting risk analysis in the direction of data obtained as a result of observations.

Istanbul Haydarpaşa Railway Terminal

For many, Haydarpaşa Railway Terminal is the first point of contact with the city, especially for those who come to Istanbul by train from Anatolia. Its splendid structure, its location, the architecture that integrates railways and seaways with a magnificent harmony puts it at a different position compared to other historical buildings of the period. <<Other than the tangible architectural heritage it attained inherent to its architectural characteristics, the link established between the users and the structure, and the image that overlaps with Istanbul in the collective memory,

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[8] Asatekin, 2004

[9] Truscott, Petzet, 2005

[10] Torre, 2002

makes this structure unique in terms of its non-tangible heritage values>>[11].

A railway station that has a very important place in terms of transportation, Haydarpaşa Railway Terminal was built as the starting station of the Istanbul-Baghdad railway line in 1908. The station is the main station of Turkish State Railways TCDD and is located in Kadıköy on the Anatolian side of Istanbul.

Fig. 1- Location of Haydarpaşa Railway Terminal Kadıkoy- Istanbul /Turkey[12].

<<The identities of the cities come into existence with the continuity of the elements that constitute those identities. The memory of the city is a mental process established socially. In this process, the city's information is remembered through collective memory and carried to the future through memory locations and places>>[13].

The role that Railway Station structures have in particular for the collective memory of the urban development and the formation of the city memory is quite complicated complex.

Project architects of Haydarpaşa Railway Terminal are Otto Ritter and Helmuth Cuno from Germany, and after about two years of construction, the terminal was opened on August 19, 1908.

The terminal was originally set on an area of 2525 m^2 and spread over an area of 3836 m^2 together with its enclosed sections of today. The architectural style of the building is in the style of "NEO-CLASSICAL GERMAN ARCHITECTURE". It is built on 1100 pieces of wooden stakes 21 m each, insulated against water. These stakes are driven in by battering hammers. The structure was built on a stake grill that was formed by these stakes.

<<The carrier system is steel carcass and the flooring system is beamed jack arch flooring. The width of the land acquired from the sea is 70 hectares and its depth is 8

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[11] Unal,Gundogdu,2011

[12] http://www.haritamap.com/yer/haydarpasa-uskudar, 2017

[13] Nora,2006

m. On its foundation, a pink granite brought from Hereke and on its façade a light naphtha colored, easy to use, resistant to weather affects stone brought from Lefke are used. The original roof covering is slate and the conical covers covering the corner towers are carried with steel structures attached by bolts. Wooden trusses were also used in the roof structure>>[14].

Case History from Past to Present

<<When viewed from the sea, the most memorable character of the Haydarpasa Railway Terminal, which creates an active image in the Anatolian region of Istanbul, is the high roof that draws the border between the structure and the sky and is regarded as foreign to Istanbul in a sense. This appearance of the Haydarpasa Railway Terminal has undergone changes due to accidents and fires that have developed beyond natural causes over a period of more than a hundred days, since from 1908 when it was built>>[15].

The terminal building opens to service on August 19, 1908, and with a great misfortune gets damaged after a fire that occurred just in the beginning of 1909.

On September 6, 1917, during World War I day, fire broke out in Haydarpasa Railway Terminal after two big blasts.
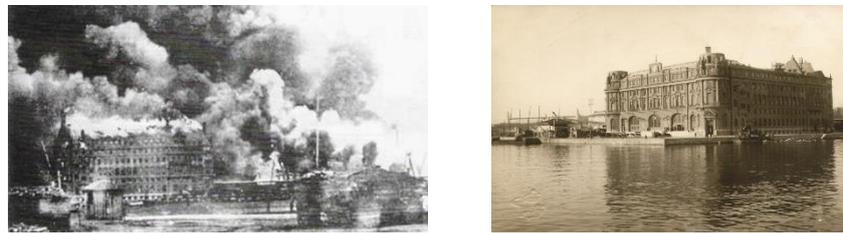
Fig.2 -   Haydarpaşa Railway Terminal during the 1917 blast and later [16].

With the explosion, when the roof of the building was completely perished, great damage occurred on the ceiling, the stained glasses were broken, and the façade linings and windows were destroyed.

13 years after the fire, with the work started in the 1930s, only the roof with the pointed triangular cross-section was replaced with a mansard roof and the rest was completely repaired faithful to the original.

On November 15, 1979, the very valuable leaded stained glasses of the building

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[14] Yildiz,1995

[15] Erkan,2013

[16] TCDD archive

suffered from the violent explosion and intense heat that resulted in the collision of the fuel-laden tanker named "INDEPENDENTA" with another ship loaded at the 800 meters off the port of Haydarpasa and it was immediately repaired in accordance with the original.

Fig.3 - 1979 Haydarpaşa Railway Terminal Indepenta accident and the repaired leaded glass windows [9].

In 1976, it was taken into wide-scale repairs and at the end of 1983, restorations of four exterior facades and two towers were completed.

It was determined that in 2005 and 2006, some interventions were made to the Haydarpaşa Railway Terminal.

Finally, on November 28, 2010, the roof and the fourth floor were severely damaged as a result of a grave fire.

2010 Fire Disaster of the Terminal

Incident: Haydarpaşa Railway Terminal November28, 2010 Sunday fire

Cause: Insulation work at the roof of the terminal,

Loss: No fatalities or wounded… Historical building partially burned

Fig. 4 - 2010 Haydarpaşa Terminal Fire [9].

Before the Incident; What happened to cause this fire?

25 days of unauthorized and uncontrolled illegal maintenance and repair work (roof repairs and insulation work), working on Sunday, no fire precautions during repair, no warning and extinguishing system present, insensible staff and workers.
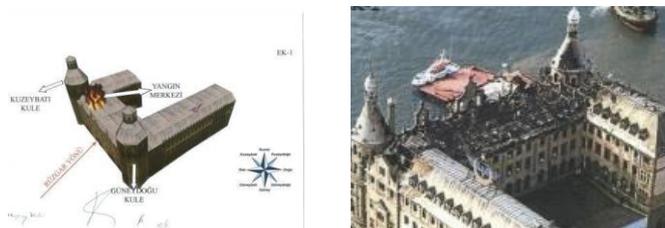
During the Incident; Cause of the incident; following aspects related to the roof have been identified.

In the survey conducted, the roof floor was covered with roof material which can be found 4 times in some points on the jack arch floor. The electrical system was built on the jack arch flooring on the roof. Electrical conduits and cable joint boxes were covered with concrete and insulation material. There was no lighting installation between the roof. However, the feeding cables of some electrical appliances and external projectors were cabled externally through the roof. More than one air conditioning exterior unit were present on the roof. The roof bearers were steel and the top was covered with wood. On the day of SUNDAY where the fire occurred, the roof was being repaired. At the time of the fire, it was determined that there was electricity in the electrical equipment inside the roof and in the installation.

The incident's;

Location: Haydarpaşa TCDD Building's roof

Date: November 28, 2010 Sunday

Time: 3:17 PM

Notice: 3:21 PM

Departure: 3:23 PM

Arrival & first intervention: 3:29 PM

Fire-out time: 5:15 PM

What the fire was fought with?

Initially, several fire stations, including Üsküdar and Kadıköy firefighting teams, participated in the extinguishing work, and the extinguish tugs also provided support from the sea. The fire brigades used 1200 tons of water during the extinguishing.

Fig. 6 - *Arrival of firefighters to Haydarpaşa Railway Terminal and the extinguishing work* [9].

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[17] İBB, 2010

During the incident; The fire brigade arrived late, the construction system was not being recognized, the fire extinguishing method damaged the structure.

After the incident; Latest status of the burned down building;

The part between the two towers of the building roof is completely burnt. Other parts of the roof were destroyed by heat and damaged by water. The upper part of the roof level of the towers was partly burned and the roofing material was deformed due to heat. The building interior courtyard and platforms were damaged by getting wet.

Contents of the Haydarpaşa Railway Terminal Restoration; The fire-devastated roof will be manufactured with steel trusses and wooden system according to the approved restoration project. Disturbed, obsolete, broken stones on the facades will be repaired. Polluted, algae-covered stone surfaces will be cleaned. Wooden windows, doors, stained glasses, hand-drawn ornaments and original floor repairs will be made.

In 2011, the roof was closed with a temporary covering material. On June 19, 2013, the city suburban train services were discontinued and the building was truly deserted. While discussing how restoration should be done, the railway station has been left waiting for five years, exposed to external conditions.

Ministry of Culture and Tourism Istanbul 5th Cultural Heritage Protection Board approved the restoration in Haydarpaşa Railway Terminal, which is a first-degree historical site, with the decision to purse restoration in accordance to the original plan in 2015.

Fig.7 -   Haydarpaşa Railway Terminal roof repair work (2017)[18].

The tender was opened and agreements were signed. In 2016, the restoration has finally started. The restoration is going on in 2017 and it is planned to be finished by the end of 2018.

Haydarpaşa Railway Terminal Risk Analysis and Conservation Suggestions

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[18]   Tasdemir,2017

<<Various natural or human-induced events that lead to physical, economic, and social loss have occurred throughout human history. Such events as earthquakes, floods, fires and wars have harmed the lives of people and the people living in it and have had lasting effects. These physical events, whether preventable or not, pose a danger to people and the built environment they have built upon. The concept of risk emerges as a result of the combination of the "danger" to which human and environmental elements are exposed and the "vulnerability" to this effect. The risk is expressed as the product of the hazard and the damage>>[19].

$$RISK = \frac{HAZARD \times VULNERABILTY}{MANAGEABILITY}$$

Risk Assessment: is the estimation of the magnitude of the risk to determine whether it is acceptable, by foreseeing the likelihood of the occurrence of a.

The purpose of the risk management is to identify the possible threats and to determine the possible threats of these threats so as to minimize the negative consequences that they will result.

In order to manage disasters, "protection-focused" risk management processes need to be planned, which includes identifying and evaluating the risks that may arise, and taking measures to minimize or fully eliminate risks.

Risk management is composed of three stages: preparation, intervention and improvement;

Preparation (before the disaster);
1. To define and map risk,
2. Reduce risk sources,
3. To certify all cultural assets, especially cultural assets at risk, and to strengthen them against the anticipated results of disaster,
4. To develop insurance systems,
5. To develop and implement early warning systems,
6. To Prepare and implement exercise plans for emergencies.

Intervention (during the disaster);
1. To implement emergency plans,
2. To mobilize conservation experts.

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[19] Kadioglu,2011

Improvement (after the disaster);

1. To destroy and ward off the negative elements of disaster (to remove flood water, to stabilize moving parts, etc.)

2. To conduct all the necessary work to reconstruct the physical and social components,

3. To oversee preparation and intervention efforts and create a better risk management model.

It should be underlined that for those three stages, actors and responsible persons (local users and community, local administration, regional, national and international institutions and organizations) and under which scale (single structure, historical environment, cultural landscape, archeological site, etc.) it will be studied should be defined and implemented.

The current risks and protection suggestions are as shown in the following table.

POSSIBLE RISKS	HAZARD	IN CASE IF RISK OCCURS
FIRE, EXPLOSION, BEING UNABLE TO INTERVENE TO FIRE	*Handmade power tool usage, *Forgotten electric heaters still on the plug at the resting places of employees, *Failure to intervene quickly during the fire *Storage of chemical materials, *Storage of materials outside the warehouses, *Flammable materials, *Failure to intervene in case of emergency , *Leaving the tubes open when there is no work on the site, *The absence of a flame back vent in the tubes, *Storage of the tubes in the open area, *Use of cables not in proper quality , *Working in the vicinity of flammable materials, *Use of oxygen tubes with greasy hands or gloves, *Stacking of flammable materials, *Failure to clean material debris, *Furnace used in the workshop, *Smoking during work, *Forgotten electric heaters still on the plug at the resting places of employees, *Failure of the electrical panels due to overload, *Sparks during the cutting of puntos, pins etc.,* Exacerbation caused by the burr, *Not having enough fire extinguishers in the workshop,	**From the perspective of people;** Injury and loss of life in the event of explosion and fire **From the perspective of the building and the environment;** In the event of explosion and fire, the burning of the building, the causing of irreparable damage, the destruction of valuable resources and documents in it
DISASTER RISK MITIGATION		
*Continuous control of electrical appliances and machines, their usage after their suitability has been evaluated, *Sufficient number of fire extinguishing tubes in the construction. *Carrying out periodic annual inspections, *Storage of chemical and inflammable materials away from fire, *Hanging of warning signs and specifying appropriate storage conditions in accordance with material safety data sheets, *Not storing of materials outside of		

areas designated as warehouse, *Placement of fire extinguishing tubes where necessary, *Operations with a commercial ABC type chemical fire extinguishing device on the site, *Placement of one flashback arrester vent each on the valve inlets and blow torch inlets of the tubes, *Storage of the tubes in a closed iron cage, after separating them as full and empty, *Hanging of 'do not approach with fire' warning signs, *Always having fire extinguishing tubes present, *Making sure the cable sections used are suitable, *Not working in areas where flammable materials are present, *Not to use greasy hands or gloves with the tubes, creating awareness in this regard, *Collection of production waste at the end of the work, *Periodical maintenance of the furnace in the site and provision of instructions, *Prohibiting smoking, *General control by a worker after each break. *Having leakage current relay on the electric panels present. *Having a system suitable for electrical needs. *Annual periodical checks to be carried out by an electrical/electronical engineer. *Attention to be paid to the maintenance of the electrical appliances used without being cut off from the electricity. *Laying fire blankets on the cutting areas. *If areas that are not predicted to have burrs or sparks are detected during operation, the operation should be stopped and the area should be cooled and the work should be resumed afterwards. *At the end of the operations, cooling should be carried out and controls should be done for 2 hours.   *Check should be done to make sure there are no flammable, combustible, explosive materials in the work area. *Work should be started after the area has been cleaned.   *A 6 kg dry chemical powder fire extinguisher should be available at the carpenter's workshop in the premises. * They should be installed in a wall 90 cm high and should be periodically maintained.

POSSIBLE RISKS	HAZARD	IN CASE IF RISK OCCURS
INTERACTION AND VULNERABILITY OF THE STRUCTURE, ENVIRONMENT, AND PEOPLE	*Earthquake *Terror, *Vandalism	**From the perspective of people;** Injury and loss of life
		From the perspective of the building and the environment; Damage on the building that cannot be repaired, destruction of the valuable resources and documents contained therein, collapse of the building

DISASTER RISK MITIGATION
* Making necessary controls against earthquake risks, * Protocols etc. with related institutions for managing the crisis situation, * Architecture, technical measures to reduce threat elements, * Function change (if possible), * Cooperation with intelligence agencies

POSSIBLE RISKS	HAZARD	IN CASE IF RISK OCCURS
Slipping, falling, falling from hig-up, materials falling from hig-up, falling from scaffolding etc.	*Slippery floors, lack of or inadequacy of lighting, *The outer surface of the building not cleaned or covered with a covering, *Failure to mount the crossings of the scaffolds completely , *Breakable staircases, *No safety rails on the stairs, *No safety belts used on the high level, *Materials falling down during the removal of the scaffolding, *No personal protection used when working at high-up levels, *Mobile Crane-Slings not being sturdy enough *Falling of the clock and stone columns on the exterior of the building, *Materials falling down from the scaffolding, *No safety rails on the operational scaffoldings, *Scaffolding (Feet of the scaffolding not lodging onto the ground properly)	**From the perspective of people;** Injury and loss of life
		From the perspective of the building and the environment; Damages on the building,

DISASTER RISK MITIGATION

* Installation of necessary anti-slippage equipment in areas where there is danger of falling and slipping, * Keeping the working environment under constant control and ensuring sufficient illumination, * It is necessary to clean the building exterior with the help of a mobile crane or similar work machine, * Not starting the work without the scaffolding cosses are full, starting the work after the fit of the crosses is satisfied, * Use of solid material in construction of stairs, support of stairs with pillars, * surrounding the work area with safety tapes, *Fencing of the scaffolding with safety area curtains, * Absolutely not working with old and worn slings, *Controlling the floor to be installed and taking all necessary precautions before starting work, * The clock and stone columns outside the building must be suspended before starting to build the roof, and proper anti-fallout systems should be installed. * A curtain (net) must be streched around the scaffolding.

Apart from all these effects, the risk of cutting Haydarpasa Railway Terminal out of the loop, with the passage of the Marmaray, a 76-km railway project between Halkalı and Gebze, which unites the railway lines of Istanbul's European and Asian sides through a tube tunnel beneath the Istanbul Bosphorus seems to be a major problem.

Conclusion and Suggestions

<<Cultural asset buildings that constitute cultural heritage are today's tangible reflections of past civilizations, different cultures, forgotten lifestyles, and deeply-rooted architectural traditions. For this reason, it is a cultural necessity to protect the wealth in question with scientific methods, with principled and sensitive approaches, and to transmit it to future generations>>[20].

<<The fire in the roof of Haydarpaşa Railway Terminal is believed to be started as a result of negligence during the insulation work which was being carried out at the moment. Fires in historical buildings are more common either during restoration or on the roof floors. Unfortunately, this fire also started between the roofs during the restoration. Since the risks were not assessed before the restoration work and the works were not under control, the accidental fire caused great damage to the historic building. The lack of adequate fire precautions during the restoration work was once again observed in this fire>>[21].

As a result; hazards indicated in the examined risk analysis and the precautions to be taken to reduce or eliminate these hazards are specified.
Strategically; plans to eliminate potential hazards to Haydarpaşa Railway Terminal

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[20] Tarim,Hattap,2016

[21] Kılıc,2010

by person or persons with the highest level of decision-making authority will be provided.

Tactically (As for People); The results of the risk analysis indicate that, potential hazards of the building are high likelihood of fire and falling from high places. Taking necessary safety precautions, emergency action plans and trainings should be conducted as soon as possible according to their level of importance.

Operationally (Tasks); Carrying out necessary exercises and audits will be realized. Continuous improvement studies will be done in the building. The shafts must be checked continuously and they should be periodically maintained. Fire extinguishers are inadequate. The numbers have to be increased. Expiration dates of existing ones should be checked.

If these measures are taken, it is envisaged that the Haydarpaşa Railway Terminal will become a healthier and safer structure in every respect.

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SAFETY OF TALL MASONRY TOWER ON MANMADE FILL IN ANGKOR WITHOUT SPECIAL FOUNDATION

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Abstract

The foundation is one of the important elements of the structure but usually disregarded. This paper describes a case study of the central main tower of Bayon temple that has been standing upon a filled mound for the past 700 years. The mound is 14 m in height of sandy compacted fill with laterite and sandstone supporting exterior elements. The main tower, which stands upon the surface of the mound, had been considered as supported by some special foundation as stone columns or a masonry well.

Archaeological excavation beneath the base stones was carried out in 2008 and nothing but compacted sand was found. In 2009 and later, geotechnical studies including a vertical boring with standard penetration test were performed from the surface of the mound. The SPT, N-values were recorded as 100-150 blows/30cm, which are very unusually large number for manmade sandy fill. This paper describes geotechnical aspects of the Angkor area as well as special characteristics of the foundation system of the heritage monument of central tower, Bayon temple.

Key words: Angkor,Bayon, main tower, manmade fill, foundation mound

Main Tower of Bayon temple

Fig.1 shows the location of Angkor at the north-eastern area of a huge lake of "Tonle-Sap." Bayon temple (Fig.2) locates at the center of Angkor Thom, Angkor, and was constructed in late 12th century by King Jayavarman VII (r. 1181–c. 1220). The temple was constructed as a Buddhist temple or possibly a state temple in a Buddhist

tradition. Bayon means Ba-Yon (beautiful tower) in Khmer and   Thrones for Gods in Sanskrit.

Fig.1 General map around Angkor
Fig.2 Bayon temple, Angkor Thom

Geological and geotecnical Condition in Angkor and Bayon

In 1994 JSA(Japanese Government Team for Safeguarding Angkor) started a conservation project of the Bayon temple. Geology of Angkor was studied by borings at Bayon temple, Angkor Wat, and in Siem Reap city. The results are shown in Fig.3 with SPT N-values. The ground consists of basically three formations of quaternary at the top of about SPT N=5-20, tertiary volcanic soft rock, and base rock. A boring at the Bayon site is shown in Fig.4, where the results of SPT, N-values in the dry season of April and dynamic cone test in rainy season of September 1995 are compared. The soil is found very sensitive to seasons or to water, stronger in the dry season than in the rainy season.
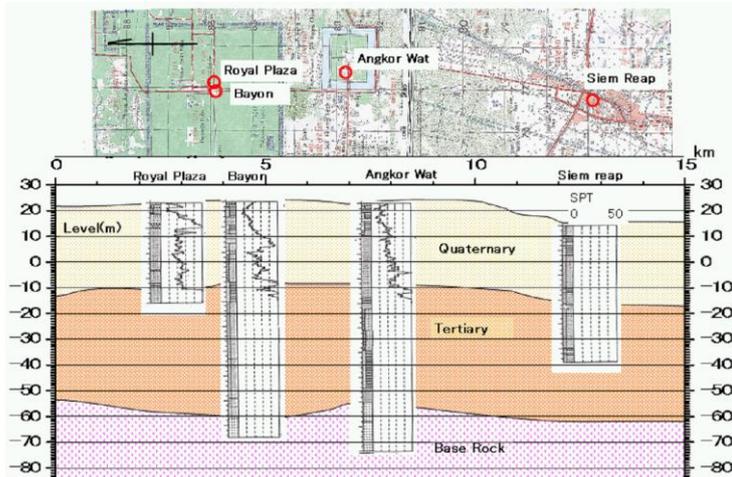
Fig.3 Boring section along NS direction in Angkor
Fig.4 Seasonal change of SPT, N-values
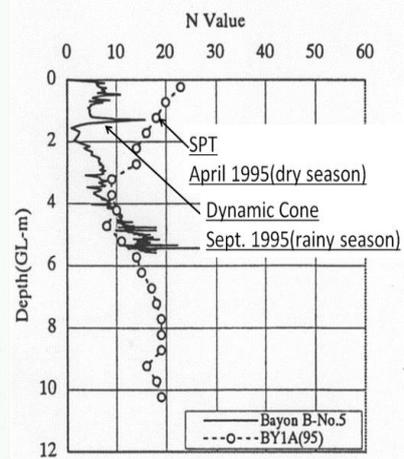
4 Foundation of the main tower of Bayon temple

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In 1933, Mr. Georges Trouvé, then the conservator of EFEO, excavated the center of the base ground expecting buried treasures. He found a Buddha statue that was broken in to several pieces along with several broken architectural elements. After the excavation to GL-14 m, the shaft was backfilled. A boring labeled BV2009 was carried out at the filled ground. The results of the SPT, N-values are shown in Fig. 5. It became clear the backfilled soil is very loose of SPT, N<4 from the surface to GL-12m. Natural ground was identified at GL-14m[1].
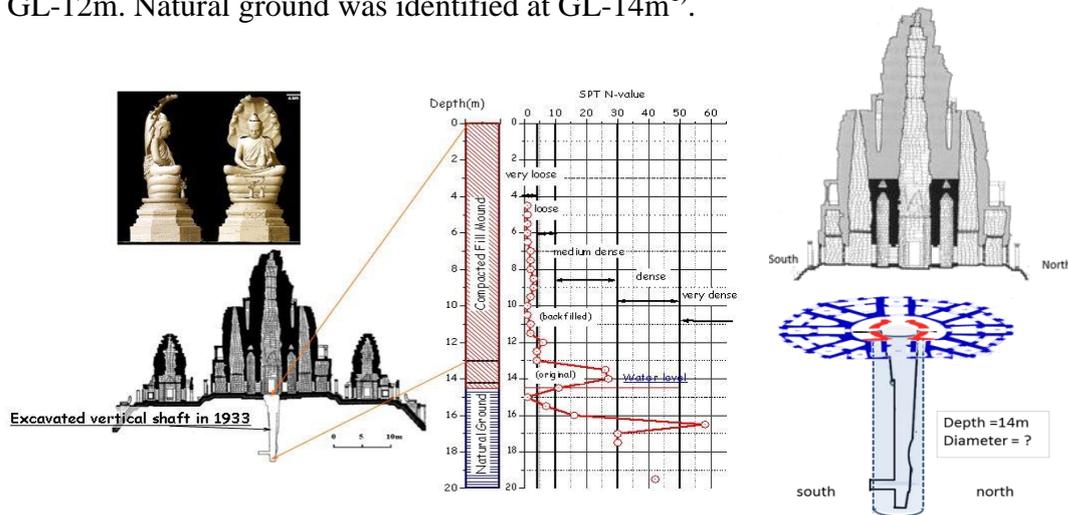
Fig.5 The vertical shaft for archaeological study under the main tower

Archaeological trench was carried out to study the foundation structure of the main tower in 2008 (Fig.6). The masonry structure of the central tower is supported by four blocks of sand stone of semi-circular in shape as shown in Fig. 7.   After removing pavement stones in the northern floor of the main chamber, northern west part was excavated to study the structure of the foundation.

Fig.6 Archaeological excavation (north-west corner)

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[1] Iwasaki et al(2014)

(Boring BV2009)
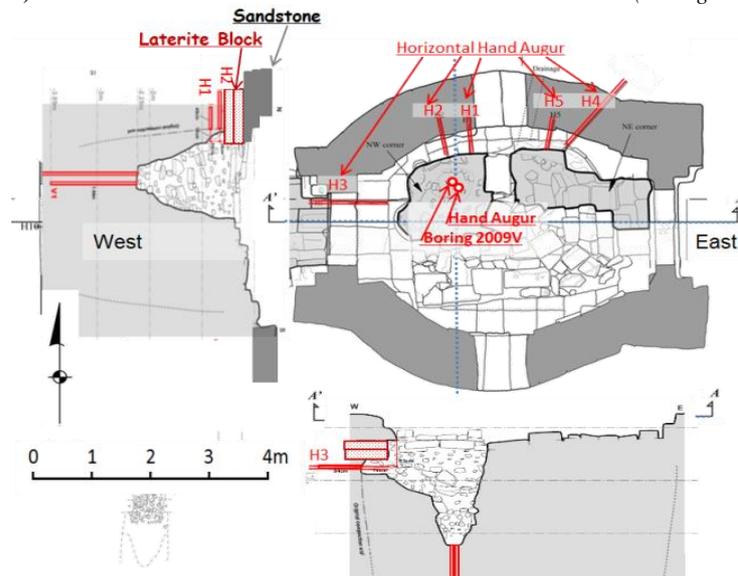
Fig.7 Excavation beneath the base stones of the main tower of Bayon temple

The foundation at the northern west part was a rather simple structure of sand stone of 20 cm in thickness followed one or two layers of laterite block as shown in Fig.7. This simple foundation was constructed upon a densely compacted sand fill mound. To confirm the structure under the laterite blocks, additional survey was planned. Horizontal hand auger sampling at the height below the laterite block was carried out at five different locations from inside as shown H1, H2, H3, H4, and H5 in Fig. 7. However, nothing but the compacted sandy fill was found by all augur samplings.[2] Amazingly the foundation is a shallow direct foundation system.

[2] Shimoda et al.(2009)

Geotechnical study of foundation mound of the main tower of Bayon

JASA (JSA+APSARA) started geotechnical study by borings in the vertical and horizontal as well as inclined directions from the third terrace surface as shown in Fig. 8.
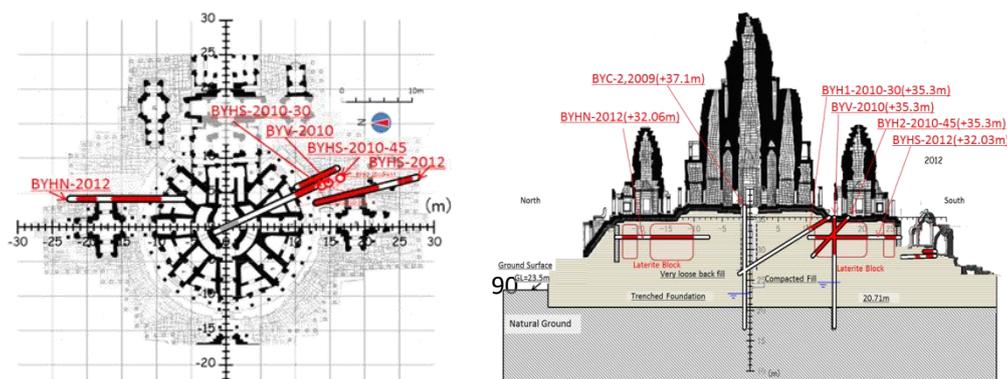
Fig.8 Boring points for the foundation mound of main tower of Bayon temple (plan and section)

Fig. 9 shows the results of the standard penetration tests of SPT, N-values for the vertical boring of BYV2010 and water content. The obtained N-values are an extremely large number of N = 100-150 blows/30cm compared to the common manmade fill of N=30-40.
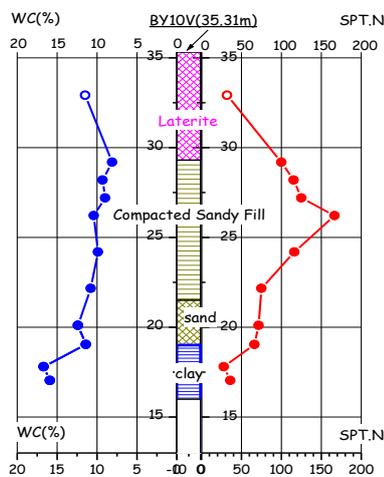
Fig.9 SPT, N-values for BY10V
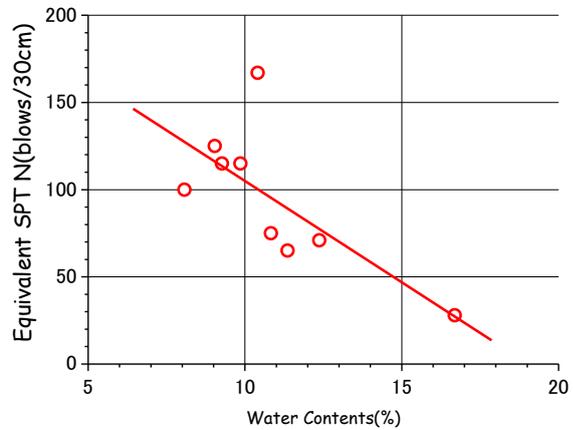
Fig.10 SPT,N-values vs water content

Fig.10 shows the relationship between SPT, N-values and water contents. When the water content decreases, N-values increase. The grain size distributions of the sampled soils of compacted fill are shown in Fig.11. The grain size distribution shows a very uniform shape with fine contents of 10-20%. Fig.12 shows how the soil is collapsing when the soil is submerged under water. It was within 10 minutes that the stiff sand became collapsed and the block disappears in water. X-ray diffraction analysis showed the soil consists of mainly quartz and kaolin clay. The strong characteristics of dried soils with fine grain size are due to the generation of high tension strength of the meniscus of water bridged between soil particles. The laboratory cone Yamanaka soil hardness tests show that the drying process induces very high strength as shown in Fig.13. The bearing capacity increases 60 times from water content of w.c.=15% to 5% shown in Fig.14. The cohesion c is estimated from the bearing capacity Qc divided by 5.14(=π+2) as shown in the same figure.
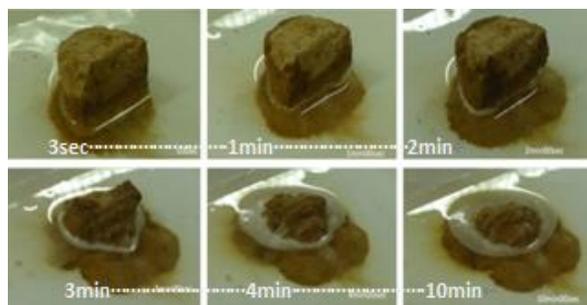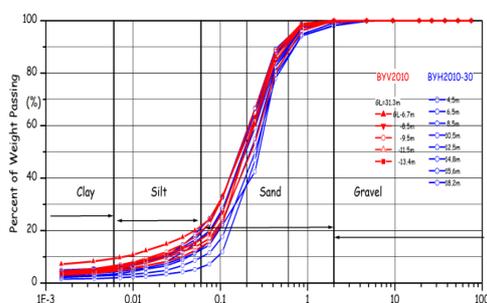
Fig.11 Grainsize distribution of sampled filled soil   *Fig.12 Melt-down of stiff sand time after submerged water*

(Ymanaka cone soil hardness tester)

(penetrating cone into   fill soil)
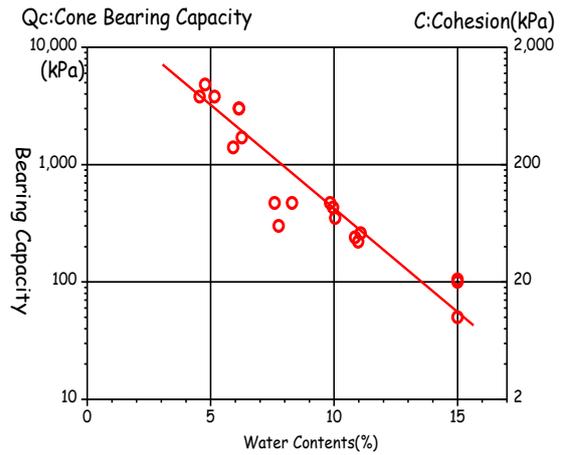
Fig.13 Yamanaka cone tester and testing for   fill soil   *Fig.14 Cone strength increase with drying process*

4 Stability of the Main tower of Bayon

It becomes clear that the main tower stands upon manmade fill mound of 14 m in thickness with an excavated and backfilled vertical shaft of 2.6 m in diameter and 14 m in depth. A numerical analysis to understand the present stable mechanism of the tower is performed by 3D FEM.[3] The main tower consists from the central tower and eight sub-towers and their vertical sections and the plan view of the base stones is shown in Fig.15.

Table-1 shows the volumes of masonry stones of the main and one sub-tower and the estimated load upon the base foundation stones. The loading steps are simulated by four stages with the final stage of the vertical shaft excavation as shown in Fig.17. The analysis was aimed to estimate the necessary strength of soils. The shear strength is introduced as $\tau = c + \tan(\phi)$ with $\phi=30°$. The friction angle $\phi=30°$ is obtained by laboratory test. Various values of cohesion c were assumed for the filled mound and the failure patterns of soil yielding are studied.

[3] Y.Iwasaki et al.(2017)

Table-1 Load of the tower upon the base stones

	unit	Central Tower	One Sub Tower
unit weight	kN/m^3	23	23
volume	m^3	967	156
total weight	kN	22,240	3,588
contact area	m^2	15	7.64
contact load	kPa	1,482	470
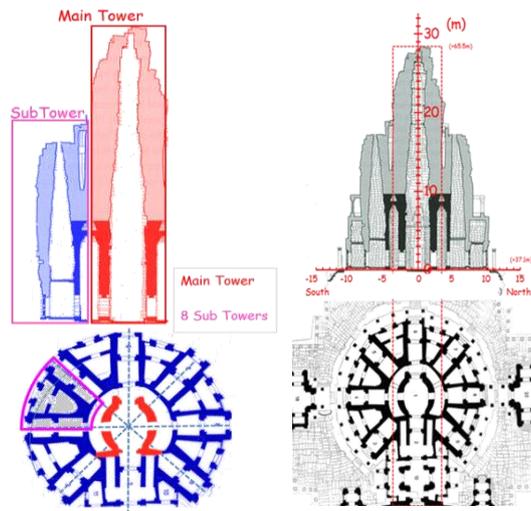
Fig.15 Vertical section and base plan
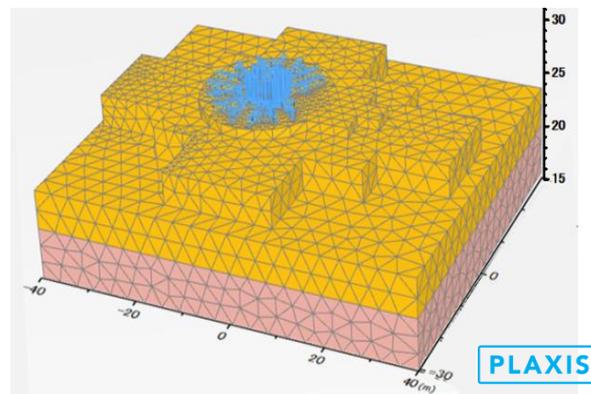
Fig.16 3D FEM Model by Plaxis

When the cohesion of soil is c=100kPa, the yielding appears beneath the base from the first stage and rapidly expands at the vertical shaft excavation as shown in Fig.18. However, the cohesion is c=150kPa, the yielding zone is limited and the foundation system is kept stable. The present fill must have the cohesion greater than C=150kPa, however, the strength is likely to decrease when water infiltrates the mound.

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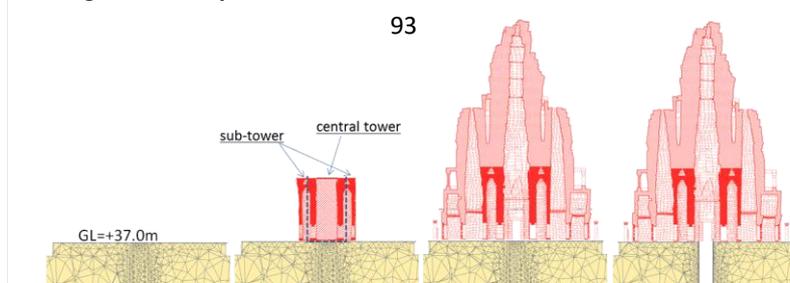
Fig.17 Loading stages
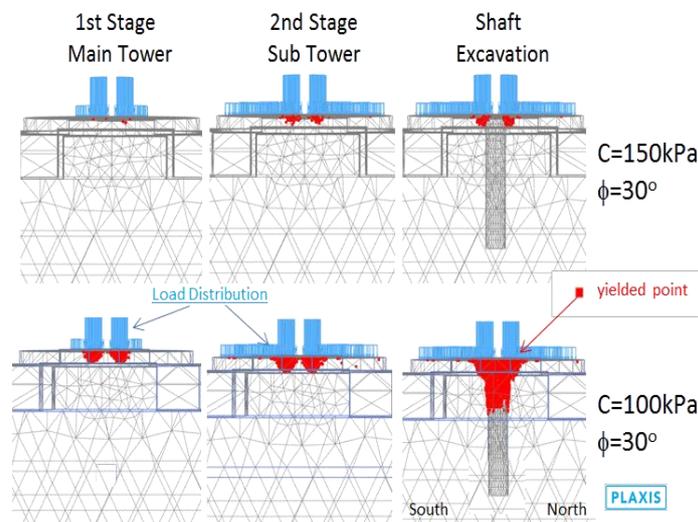
Fig.18 Yield zone for C=100, 150kPa with ϕ=30°

At present, the rain is a short shower of duration of only two to three hours and the water does not infiltrate enough to weaken the soil. However, global warming creating increased precipitation cycles is anticipated to induce severe damage of the foundation system in not only Bayon, but also in Angkor Wat.

Conclusion

Geotechnical survey by trenching the ground of inside of the foundation stones at the center of the main tower of Bayon temple and horizontal auger sounding beneath the base foundation stones have resulted in the following conclusions:

Any special foundation system was not found but only a single layer of sandstones upon laterite blocks, which were based upon a manmade platform mound of sandy

soils.

Geotechnical boring as well as laboratory tests on the filled soils have showed the very unique characteristics of the soil as follows,

The samples of the filled soil by borings show uniform grainsize distribution of fine sand with fine soil contents of 10-20%. Very large number of SPT, N-values of 100-150 was obtained and laboratory tests showed the strength of the soil at dry state becomes very high because of surface tension of meniscus of the water bridge between soil particles, however, loses easily by wetting of water.

Rainfall in the area at present, duration time of rain continues only 2-3 hours, results in the infiltration of water into the surface but not very deep. However, under the anticipated global warming condition, much longer and heavier rain might cause deep infiltration of water and destroy the foundation system, which had been experienced at the nearby pyramid mound with the collapse of Baphuon temple.
The main tower of Bayon temple in Angkor of 31 m in height from the ground has been standing upon base stones directly on manmade fill of 14 m in thickness for the past 700 years.

The key features of this soil type and the foundation style are very unique and character defining elements of the authenticity of the material and foundation design.
We need to prepare necessary countermeasures to protect the main tower as the symbol of Bayon temple from anticipated increases in rain to restore the heritage base using preventive countermeasures and preventive monitoring while insuring authenticity.

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UNMASKING THE URBAN PALIMPSEST THROUGH SUPERIMPOSITION OF HISTORIC MAPS: THE CASE OF ISTANBUL'S AKSARAY DISTRICT

Meltem Vatan [a,] Efsun Ekenyazıcı Güney [b], Bengü Uluengin [b]

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[b] Bahcesehir University, Faculty of Architecture and Design

Abstract

Metropolises like Istanbul, where marginalized populations have hope of finding a job, having a safe place to live or simply trying to sustain their lives, have seen a large influx of migrants and immigrants. The profile of these new citizens includes ordinary people, refugees and victims of war. Demographic change and city's transformation are due to these new citizens and in some particular periods, mass migration has an important role in settling as large groups in a certain district or settlement and transforms city's faces as well.

Focusing on the Aksaray district as a case study, this paper attempts to emphasize the significance of cultural identity, the feeling of being part of the city and the feeling of being connected to the city in terms of conserving and sustaining the city's identity – particularly in metropolises with rich histories, spanning hundreds of years from historic periods till the present. Make a proposal for using of urban space and managing the risks in order to protect culture and identity and to structure the new ones in course of the time could be stated as challenges of this case study.

Key words: palimpsest, urban memory, cultural heritage, historic environment, reading maps

Introduction

Pioneering urban theorists such as Spiro Kostof (1991) and Kevin Lynch (1981) have argued convincingly that the outward appearance and constituent components of cities

are open to transformation over time, due to various affects. During the past few decades, throughout many parts of the world, the phenomena of globalization and migration might be the major parameters that effect this transformation. These two phenomena are affecting the globe not only demographically, but also socio-culturally and spatially. In accordance with this vast transformation, the identity, characteristics and the representation of the cities also transforms. So, it is getting more difficult and important to keep the authenticity or the local characteristics of the cities. While these characteristics allows cities to acquire new senses and functions or defines[22]. New social and spatial relationships, understanding the connection between past and present layers becomes an important issue. In that context the city becomes a composite of a series of layers that have accrued over a period of time, embodying the identity of both past and present[23]. In the larger context, the juxtaposition of these layers provides us with rich clues regarding the changing identity, lifestyle, and architectural practices of the periods in question.

It is important to underline that these layers should not only be read as evidences of spatial relationships, but also the importance of the cultural relations should be emphasized. Bukova points out the importance of culture and its impact on the life and posterity with her statement as *"Culture implies more than just monuments and stones – culture defines who we are. It carries universal values and the many faces of our shared humanity. It is the wellspring of collective imagination, memory and belonging. It is a source of resilience, well-being and social cohesion. It is a force for recovery, creativity and innovation…"* [24]. However, protection of cultural heritage and its values became a challenge in many places around the world, particularly in metropolises where hasty transformation is a fact. At present, based on migration, immigration, income level differences, literacy, level of education and the like, demographic pluralism and cultural diversity are the challenges faced by big cities. These could be stated as the drivers of city's transformation and as tools for managing the risks in cultural heritage protection.

In the case of a city such as Istanbul, which has a long and rich history and is a modern metropolis, preservation of the heritage and historic environment with a wide variety of cultural meanings and values for the citizens, and for the city itself, could

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[22] Valceanu, et al., 2014

[23] Nooruddin, 2012

[24] Bukova, 2017

be regarded as a challenge. To manage all these issues, and to integrate the historic environment into the modern city, a holistic approach is required including all parameters such technological development and its requirements, heritage values both tangible and intangible, social profile changes, and so on.

The main result of this demographic change could potentially be a sense of not belonging, and not having a real connection with the place. Mostly, new citizens establish their districts where there is no relation with the city both physically and mentally. The tendency is to use the city like a hotel or like a work place with the hope of having a better and safer place to live. In this point the main problem is using spaces as places without having responsibility to the city itself. This study proposes to use the concept of "palimpsest", which can be seen as a tool of narration of the truth of what previously was, and to draw a connection with the present through a series of layers, both tangible and intangible.

In this study, instead of a nostalgic reconstruction of all traces of the palimpsest, tangible heritage such as historic streets, squares, arcades or structures establish rational continuity with the past while the intangible heritage - urban rituals and rites re-adapt the use, form, or meaning of these physical elements and synchronize them with contemporary ones[25],[26],[27],[28],[29],[30].

The Aksaray district in the historic centre of Istanbul, with a vast history of urbanity that consists of multiple layers, is chosen as a case study for this paper. This site is located in a densely urbanized context with numerous monumental buildings (herein referred to as 'anchors of urban memory'); each conceptualized, constructed and reconstructed in differing historical settings. The site is still an integral part of the city's cultural life representing a perfect case for unmasking the palimpsest of a heritage site. From this perspective the study tries to understand meaningful relationship possibilities between old and new layers of cities and investigates the links between a historical city and its urban memory.

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[25] Broadbent, 1990

[26] Rowe and Koetter, 1978

[27] Rowe, 1997

[28] Lynch, 1981

[29] Rossi, 1984

[30] Vidler, 1978

Aim

The main objective of this study is to explore the transformation process of a district in Istanbul that is an important urban heritage site, and which has had critical periods of demographic and social change during its long history. As such, the district can be perceived as an "urban palimpsest" with issues such as "collective memory" and "identity" coming to the fore. Within this framework, various sources and tools are used to understand the fundamental thresholds—or points of rupture—within this transformation.

These goals are achieved by sub-objectives such as exploring the transformation of Aksaray, a historical district of Istanbul where it is possible to chase the clues of several urban layers. This district is investigated as an urban palimpsest through analyzing its historic layers by in depth literature review and a series of four maps. Both tangible and intangible heritage values of the district are examined, the social, cultural, spatial, demographic change in course of the time is analyzed in order to attain the anchors of urban memory. Transformation of the city face based on the effects of forced migration, political conflicts, wars and disasters etc. is dealt with as a challenge of cultural heritage protection.

The aim of this paper is to trace the changes, thresholds and the drivers of this obvious transformation by finding out what has happened in the past, what is happening now, and what is likely to happen in the future in the case study area. This study attempts to identify what we have termed the "anchors of urban memory" of the Aksaray district to uncover the salient points of the palimpsest that comprises the district. Therefore, it is also aimed to explore possible characteristics of the district which could be used as tools for cohesion of city, origin and identity to protect cultural heritage.

The protection of culture and heritage with their tangible and intangible components is essential for the continuity of the spirit and the characteristics of a city or a district. In order not to lose these values it is important to define and analyze them thoroughly. This study, therefore, attempts to undertake a holistic look at the Aksaray district.

Methodology

The concept of this study is cultural continuity in metropolises which is dealt with the

retrospective study design. Based on this concept, methodology of this study comprises qualitative research approach which is supported by in depth literature review, superimposition and in-depth reading of maps and photographic documentation at the site.

Since qualitative studies are undertaken by describing, understanding, exploring concepts, using relatively subjective procedures, the goal of this methodology is achieved by converting these conceptual phenomena to the variables in order to operationalize the concept. A set of criteria reflective of the concept are defined as indicators to be converted to the variables. Maps of the case study area are used as the main variables to trace the transformation and to define the thresholds of the significant changes. The monuments, existing present, are referred to as "anchors of urban memory" since they act as "place holders" for urban memory. This, in turn, creates and recreates the collective memory that is inextricably linked with a sense of place, and *genious loci*.

The idea is to reach a holistic understanding via extensive exploration of the selected case study, and to provide an in-depth and rich narrative of the districts mode of being.

Contextualizing Urban Heritage as a Palimpsest

Many texts on urban history tend to perceive reconstructed areas (such as Aksaray, after the major fire in 1855) as *tabula rasa*s, the assumption being that the re-planned neighborhood bore little semblance to what existed before.

Here, we turn this argument on its head, stipulating, instead, that there is considerable continuity in Aksaray's fabric throughout the centuries, including the nineteenth.

A theoretical explanation of this phenomenon can be found in the works of Lefebvre (86) and Kuban (79), who have repeatedly commented on the continuity of social and urban space, noting that "*[no] space disappears in the course of growth and development ... social space, and especially urban space ... emerge ... with a structure far more reminiscent of flaky mille-feuille pastry than of the homogeneous and isotropic space of classical (Euclidean/Cartesian) mathematics*"[31]. Even Berin F.

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[31] Lefebvre, 1991, pp: 86

Gür—who suggests that when social dynamics and power relations undergo an abrupt change in society, a comparable "rupture" in the continuity of the built environment occurs—concedes that the old is never completely eradicated (242). As such, the planning activities that took place after the fire of 1855, for example, can be viewed as the superimposition of the Modern over the Medieval; the activities of the early Republican period can be seen as the juxtaposition of the Republican over the Ottoman. None of these erase the past completely, but add another layer to a complex palimpsest that the urban fabric of Aksaray has become. Therefore, if the interest of historic preservation is to reflect the physical and cultural narratives of a place, then it is this palimpsest that should be preserved, and interpreted.

Case Study: Aksaray District

The case study of this paper—the Aksaray district—is one of the oldest districts of Istanbul with a history dating back to the Byzantine period. It is also significant as a place where mostly migrants and immigrants have settled throughout much of its history. Geographically, Aksaray is located on the main thoroughfare running through the city, referred to as the Mese in the Byzantine, and Divanyolu in the Ottoman periods respectively. It connects the administrative center of the city with city walls, and hence, the main gate of the city.

Despite its historic significance, the Aksaray district has eroded in importance during the course of time. At present, the district has been transformed to the place of migrants, immigrants and low income people. This transformation has brought risks to the protection of cultural heritage and challenges to mitigate and manage those risks.

Brief historic review of Aksaray district

Aksaray is located in the Fatih Region of modern Istanbul and it is one of the oldest districts in the Historic Peninsula of Istanbul. It is part of the diverse and rich urban history of an ancient city, which through time has been transformed into the metropolis that it is (New Rome / Constantinople / Istanbul). This district is located on the Mese—the Byzantine thoroughfare comprising the city's "backbone". This thoroughfare continued to serve as the main route of access to the city center in the Ottoman Period as well. The beginning of Byzantium's Mese is marked with the Million Stone (a monument in the present) which, according to Byzantine lore,

represented the 'center of the world'[32].

The tangible and intangible values of Aksaray district contribute to the urban memory and collective memory of the city itself. This district, firstly mentioned in the map of Bundelmonti dated back to 424 A.D. always had been among remarkable districts of the city[33]. Bundelmonti divided the ancient city into 14 governorates;   the Aksaray district is included among these[34].

The settling of Aksaray from the Byzantine period on is not a random phenomenon. Indeed, the area presented the ideal conditions for settlement, including access (being on the Mese and later the Divanyolu), and, being close to the Lykos stream, the availability of abundant fresh water[35]. The abundance of water, as we will see in the section titled "Reading the anchors of urban memory through historic maps", is an important character defining feature of the district, leading as it does to a variety of site-specific functions to flourish, such as public baths, fountains and urban vegetable gardens.

In terms of anchors of urban memory, the Aksaray district contains numerous antique necropolises, mosques and related structures such baths and madrasas[36,37]. During the transformations of the city following the Ottoman conquest and later the formation of the Turkish Republic, some of these historic buildings are demolished in order to enlarge the main roads such as Vatan and Millet streets. Beside construction activities, natural disasters such as fires also had an important impact on the construction and transformation of the district. Recorded significant fires date back to 1752 (500 shops and 1500 houses were burnt), 1855 (748 buildings were burnt), 1873 (186 buildings were burnt), 1890 (200 buildings were burnt), 1911 (2400 buildings were burnt), 1955 (a church was burnt), 1962, 1969 (a small opera building was burnt)[38]. The fire in 1855 is quite significant, because this was seen as an opportunity to re-plan the district according to a grid layout. Zeynep Çelik refers to this phenomenon as

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[32] Wiener, 2007

[33] Kafesçioğlu, 2009

[34] Kos, 1995

[35] Wiener, 2007

[36] Wiener, 2007

[37] Kafesçioğlu, 2009

[38]Sezer 2010

"regularization" and it is a recurrent theme throughout many districts of the historic peninsula in the 19th century[39].

In terms of trade, Istanbul has always been a node for connecting the East and the West. And the Aksaray district played a relatively important role in this connection. Being located on the city's main thoroughfare, lying along the Lykos stream, having water resources and fertile land, the district was always an important constituent in the image of the city. In the recent decades, however, this image has changed drastically. Presently, the district is only a shadow of its old glorious self, being declared recently by The Times News as "the beginning point of human trafficking"[40].

Dramatic transformation: from glorious district to the downfall

In the modern city of Istanbul, Aksaray forms an important node for most modes of public transportation and vehicular traffic in the Historical Peninsula. This could, in fact, be one of the primary reasons why it is presently being settled by migrants.

The first threshold, or rupture, in the transformation of Aksaray is the conquest of Constinople by the Ottomans. Following the conquest, the city was gradually transformed into one reflecting Ottoman-Turkish culture[41]. During this period, the district was settled by governorate staff and high income families due to its proximity to the Topkapı Palace.

In the late-Ottoman period, when Bolshevik Russia attempted an expulsion of Muslim Crimeans—who were considered to be of Turkish origin and were suspected of supporting Russia's enemy, the German Government—many Crimeans and white Russians immigrated to the Ottoman Empire via the Black Sea and the port city of Sinop. A large part of this population eventually ended up in Istanbul, and settled here in the Beyoğlu and Aksaray districts. The residents of Aksaray were slow to accept the newcomers, but cultural interaction took place over the course of time[42],[43].

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[39] Çelik, 1986, pp: 49-81

[40] http://www.milliyet.com.tr/istanbul-un-multeci-semti-aksaray-gundem-2009965/

[41] Kos, 1995

[42] Bezmen, 2013

[43] Bezmen, 2014

Regardless, Aksaray continued to be a neighborhood of high stature. During the 19th century, following the fire of 1855, the district was re-planned along a grid layout and its streets were widened significantly to 15.20 m, and lined with trees. The Divanyolu-Aksaray area was the focal points of this regularization. Yerasimos also cites the large number of Crimean migrants as being instrumental in the re-planning of the district[44].

Another rupture in the district's history could be related to the construction activities in 1950 – 60s. At that time, Aksaray continued to be an important transportation node, this time becoming a major intersection for automobiles as it was Vatan and Millet streets were widened. The Vatan and Millet streets are of prime importance since the merge to create the main thoroughfare leading to what was the Byzantine Great Palace, and now is the Topkapı Palace. One of the most important anchors of urban memory in the district—the Murad Pasha Mosque, is located at the intersection of the two streets.

Disintegration of Soviet Union created a new trade trend called as shuttle trade at 1990s. This trend was based on frequent trips between Russia and Turkey to sale the goods in an amount of a suitcase or two of goods per trip. The location of this commerce was Aksaray and its surroundings in Istanbul. This caused the district to be eventually settled by Russia nationals. Signs and advertisements in Russian could be seen all around the district, and Russian had practically become the second language used in the area. This trend was one of the popular commercial activities since the economic crisis of 1998[45]. In addition to Russian nationals, traders from Bulgaria and Romania were also active in the district. However; the most dramatic change in the demography of Aksaray, is linked to the formation of the European Union. As Ünal notes, especially after Romania and Bulgaria joined the European Union, migrants from Georgia, Azarbaijan and Armenia who were headed towards the former now found their way to Istanbul, and in Istanbul, to Aksaray[46]. Following the outbreak of the Syrian Civil War, migrants from this country also began to settle in Aksaray.

This new diverse population has now essentially divided the area under scrutiny into two, with Millet Street being the border between the two zones. One part is settled by

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[44] Yerasimos, 1996

[45] Kırcı, 2007

[46] Ünal, 2015

the Georgian, Azerbaijani and Armenian population and the other part is settled by the Syrian migrants. The language on signboards is mostly dominated by Arabic language while   Russian-language signs are to be seen. The common remark of the locals is an increasing percentage of theft, prostitution, drags and human trafficking[47].

One of the main reasons for this social downfall could be connected to the daily use of the area. In its present condition, the district includes commercial function mostly and due to this fact the night use is almost none. This brings security problems and gives convenience to be used by homeless and illegal activities during the night.

Reading the anchors of urban memory through historic maps

Modern era maps drafted using scientific techniques of cartography are the main source of raw data used for this study. Modern cartography was introduced into the Ottoman Empire by the Germans, who at the time were in close military relations with the Ottomans. Later, attempts by the local administration of Istanbul, and also real estate insurance companies ensured that extremely detailed maps of the city would be drafted. Here, we draw upon the vast amount of information embodied in these maps to derive an emergent narrative of the district, and to unmask the layers within the complex palimpsest that comprises it.

German Blues

The set of maps known as the 'German Blues' are the most accurate and comprehensive maps of Istanbul drafted prior to WWI. The maps contain many anchors of urban memory.

The anchors of urban memory found in the German Blues and subsequent maps were categorized, and coded as follows: R (religious building), RA (buildings affiliated with religious complexes), E (educational facilities), PM (police or military facilities), TDG (tram depots or garages), W (urban features related to water), and C (cafes). Looking at Plate K7, which encompasses most of Horhor (a neighbor of Aksaray district) as well as the Murad Pasha neighborhoods, we see several anchors of urban memory:

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[47] Ü nal, 2015

Murat Pasha Mosque (Djami Mourad Pacha) (R2), located on the street by the same name, Hindiler Dervish Lodge (Hindouler Tekkesi) (RA3), located on Çıngıraklı Bostan Street, Aksaray Military Police [Station] (Ak-Serai Police Militaire) (PM1), located at the intersection of Bostan Street, and Selim Paşa Incline, the Hasanağa School (Hassanaga Medresse) (E3), located on Çıngıraklı Bostan Street, and the Cevher Paşa School (Djevherpasha Mekteb) (E4), located on Şakir Paşa Street.

It is interesting to note that an important building in the area—the Valide School—is not yet built at the time that the German Blues were drafted, and that the plot of land that the school still occupies was in fact, the Valide Sultan Cemetery (Valide Sultan Mesarlik) (RA2). Later, in the Pervititch maps we will see that the cemetery occupies a much smaller plot of land, with the rest being taken over by the Valide School.

Fig.4 – Plate K7 of the German Blues

Plate K6 of the German Blues is also quite rich in anchors of urban memory. Here we see the following prominent buildings:

School (Ecole) (E5), located on Katip Muslahaddin Street, Katip Muslahaddin Mosque (R6) located on the same street, Valide Sultan Mosque, located on Ak Saray and Valide Sultan Cami Streets,   Murat Paşa Mosque (R2), located on Millet Street, Çakır Ağa Mosque (Tchakir Agha Djami) (R3), located on Çakır Ağa Street,   a mosque along Aksaray Street simply demarcated 'mosque' (correlation with other maps reveals that this is the Camcılar Mosque [R3]), cemeteries and mausoleums related to the Valide and Çakır Ağa mosques, Police Station (PM2), located at the intersection of Topkapı and Cerrahpaşa streets,   as well as a water tower (W4) located on Çakır Ağa Street. This water tower is not explicitly marked in this map (but correlation with the Pervititch maps reveals its location), it will, therefore, be

discussed in more detail under the Pervititch Maps heading.
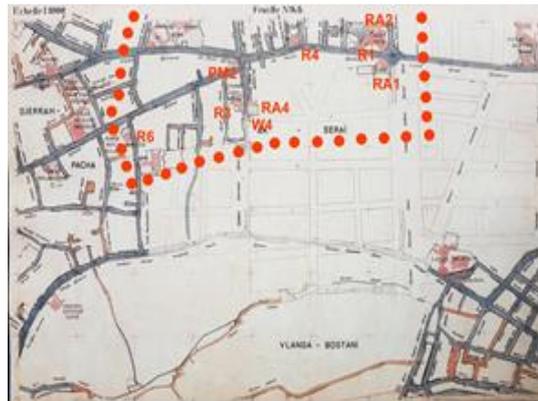
Fig.2 – Plate K6 of the German Blues

1922 City Map

Among the set of maps under scrutiny, the appellation 'Horhor' appears as a neighborhood name for the first time in the 1922 City Map. Horhor, onomatopoeia for the sound of water gushing from a fountain, is the name of the neighborhood immediately to the north of the area under scrutiny.

Among the 'anchors of urban memory', mosques rank as high as the most conspicuous and most numerous. This, obviously, is not surprising as they are built to outlast the frequent earthquakes and fires. Also worthy note, however, are public buildings or *vakif* complexes that are delineated (but not always named) on the map. The 1922 City Map, in fact, can be viewed as a Nolli Map of sorts, for even though the relationship of solids to voids is not as clear as in the Nolli Map of Rome, public buildings are clearly demarcated. This serves the purpose of the present study, for these public buildings are usually the most potent anchors of urban memory.

Among the anchors of urban memory visible in the map, Valide Mosque (Valide Djami) (R1), and Murad Pasha Mosque (Mourad Pacha Dj.) (R2) are worthy of mention.
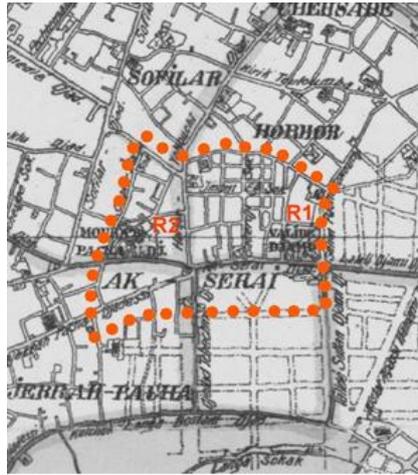
Fig.3 – 1922 City Map

Pervititch Maps

Of the maps under scrutiny, the Pervititch series provides the richest narrative for understanding the district's urban memory –be it tangible or intangible– owing to the immense amount of detail provided therein.

Among the maps of Istanbul drafted prior to WWII, the Pervititch Maps are by far the most detailed. Drafted for an insurance company specializing in insuring real estate, the maps provide detailed information about the construction system of all buildings (wood buildings, because of their susceptibility to fire, posed much greater risk for insurance companies), as well as anti-theft devices on windows and doors (such as metal bars).

Through a meticulous reading of the maps and subsequent coding, a number of emergent narratives related to the district came to the fore. In the section below, this narrative is detailed through a reading of each of the Pervititch plates related to the district (Aksaray district, plates 45, 53, 54, and 57).

Plate 45 provides an apt point to start investigating the area's urban narrative, for it includes an important water-related building: the Horhor Public Bath (hamam), W1. As noted above, the name Horhor derives from the onomatopoeia of water gushing from a spigot or fountain. Indeed, Horhor was a location where nature provided abundant, fresh water. As such, water-related structures form an essential part of the anchors of urban memory in the district.

Also of importance is W2 (simply marked as "fountain" on the map). The name of the street the fountain is on, however, gives away the name of this water-related structure: Paşa Çeşmesi (Pasha Fountain) Street.

This part of the district also has a prominent educational facility, Hasan Ağa Medrese (E3) located on Çıngıraklı Bostan Street, and a religiously affiliated building—Hinduler Dervish Lodge (*tekke*) (RA3) located on Horhor Street.

Plate 53 of the Pervititch maps includes some of the most significant anchors of urban memory in the area. Among these, the Yeni Valide Mosque (R1) located at the intersection of Ordu and Mustafa Kemal streets, and the Valide School (E1) located on Mustafa Kemal Street are worthy of attention for their architectural qualities. In terms of the district's emergent urban narrative, however, also of equal importance is Turhan Bey Mansion (PM1), which is also marked with the words "Former Police Station" (Ex-polis merkeziyesi). Located at the intersection of Çıngıraklı Bostan and Mustafa Kemal Streets, this building is none other than the Aksaray Military Police [Station] (Ak-Serai Police Militaire) found in the German Blues.

It is also interesting to note that a street in the area is named 'Dağarcık', which literally translates into English as '[mental] repertoire' i.e. 'memory'.
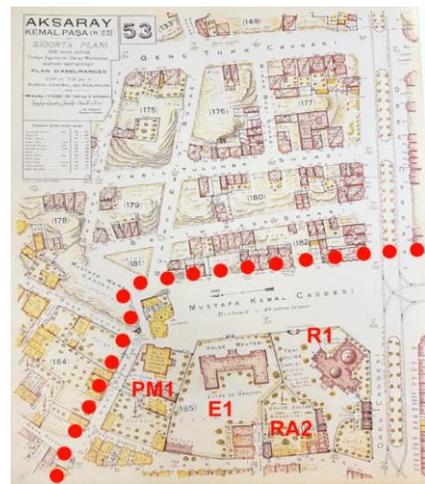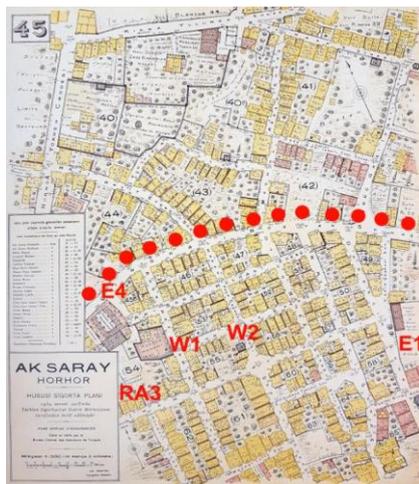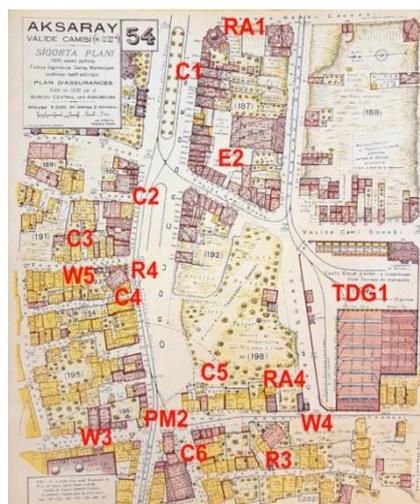
Fig.6 – Plate 54 of the Pervititch Maps

The next map in the Pervitich series, Plate 54, is extremely rich in anchors of urban memory. In fact, it is this plate that allows us to glimpse into some of the intangible aspects of urban heritage in the district. Besides the usual 'anchors of urban memory', Pervititch maps attest to the existence of certain intangible features that most likely contributed significantly to the urban memory of the neighborhood. The most notable among these is the existence of a large number of cafes (*kafe*) in the area. Identified in the map with codes C1-C6, these cafes are located on Ordu, Nalıncı, Şekerci, Camcılar Cami, Namık Kemal, and Cerrahpaşa streets.

As noted by Kömeçoğlu in his article titled "The Publicness and Sociabilities of the Ottoman Coffeehouse," the coffeehouse in Ottoman Istanbul was a "heterogeneous" space which served many purposes, including informal meeting spaces for dervish lodges (*tekke*), and mosques; theaters, where shadow players, jugglers, musicians, and male dancers performed; reading salons (*kıraathane*); political clubs (especially in areas where janissary barracks were located); and oriental gardens (open air coffeehouse)[48].

The fact that Aksaray houses many of the above functions could explain the high prevalence of coffeehouses in the area. Another important feature in the area is a sizable tram depot, occupying a whole city block between Valide Cami, Inkılap, Cezmi, and Namık Kemal streets. Although not all of them are within the specific area under scrutiny, the Aksaray district has a large number of depots and municipal

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[48] Kömeçoğlu, 2005, pp: 15

garages for vehicles of public transport.

Plate 54 is also rich in urban features related to water. Among these, the Ak-Saray Public Bath (*hamam*) (W3) is the most prominent, being the largest public bath in the area. Also of interest is an urban feature known as a 'water tower'. Water towers were relatively abundant in Istanbul, and they helped balance the pressure in the city's extensive fresh water system—parts of which dated to the Byzantine period. In the area under scrutiny, such a tower (W4) is to be found opposite Çakırağa Mosque on Namık Kemal Street. In Pervititch's map, the anchor of urban memory is clearly marked as "Tour de Eau" (water tower).

Beyond these features, Plate 54 is also relatively rich in terms of monumental anchors of urban memory, such as Çakırağa Mosque (R3) located on Çakırağa Cami Street, and Camcılar Mosque (R4) located on Ordu Street.Contributing to the district's character as one where security forces were concentrated is a police station (PM2) located at the intersection of Cerrahpaşa and Millet streets. Finally, an educational facility, the Sixty-Fourth Primary School (64'üncü İlk Mektebi) (E2), is to be found on Valide Cami Street in the area under scrutiny.
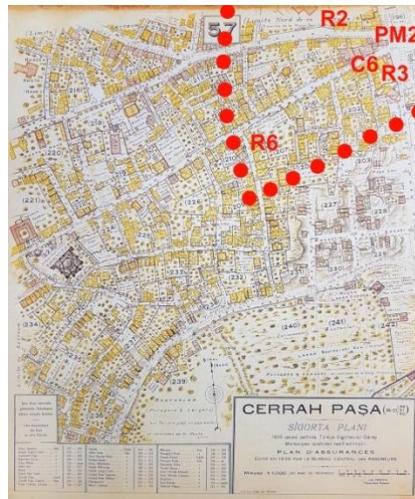
Fig.7 – Plate 57 of the Pervititch Maps

The final map in the Pervititch series, is map titled Cerrah Paşa (Plate 57). The most prominent anchor of urban memory on Plate 57 is Murat Paşa Mosque (R2), located on Millet Street. Also of note is Katip Muslahaddin Mosque (R6) located on the street with the same name, police station (PM2) located at the intersection of Cerrahpaşa and Millet streets, and a cafe (C6) located adjacent to the police station.

Finding s of the Case Study: The Emergent Narrative

From the above analysis, a multi-faceted and richly layered narrative of the neighborhood comes to the limelight. This emergent narrative revolves around the district's anchors of urban memory, but also points to the existence of many intangible examples of cultural heritage. Prime among the district's anchors of urban memory are religious and religiously affiliated buildings, but also of importance are water related structures, police and military police stations, and numerous cafes, and depots and garages for trains and other public transportation vehicles. The latter two actually point to the rich intangible heritage of the district, with cafes being used mostly by male civil servants and particularly members of the military class. In his study focusing on the coffeehouses of Istanbul, Kırlı finds that the majority of coffeehouses in Istanbul are owned by Muslims, and among these, those serving in the military comprise a sizable portion[49].

Also of importance is the observation that the district is dominated by many modes of transportation, and that in fact, it comes forth in the emergent narrative as a place where 'one stays for a limited amount of time'. This is a remarkable observation, for it is possibly the same feeling that migrants and refugees have with regard to their existence there.

On the other hand, with monumental buildings such as the Valide Mosque and the Murad Pasha Mosque, the district also boasts a rich and privileged history. As noted before, these findings are not at odds with each other, nor do they create a contradicting narrative of the city. They are simply different layers in what makes up the rich palimpsest that the district is.

Conclusion

In big cities such as Istanbul, the clash between preserving the identity of the historic city while remaining a viable modern metropolis is ever present. Beside their cultural and historic values, historic areas include various characteristics and functions as an integral part to the modern city, where many different physical and symbolic values both tangible and intangible are attributed. These values are representatives of a long

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[49] Kırlı, 2000, pp: 83-97

and rich history with the traces of each layer of the rich palimpsest embodied in the city fabric. Within this framework, members of the local population are the most important actors in generation and transformation of the city and preservation of the historic character as well.

Culture and heritage, with their tangible and intangible values, are some of the most potent expressions of identity. Therefore, their protection is essential to ensure posterity and wellbeing of a locale or cities citizens. In cases where cultural diversity is a character defining feature, with the community being structured by immigrants and migrants, protection is also fundamental for security, peace, and prevention of violence. When all groups in society are honored and allowed to express their identity, they are able to live together in harmony and tolerance. In diverse populations and communities, cultural heritage protection is directly linked with social cohesion.

This study explores the characteristics of social continuity, ant its reflections on what has been termed the 'urban palimpsest' in order to understand the complex set of dynamics that are set in motion when the demographic makeup of a district or city changes. It also aims to investigate the links between the distinctive spirit of a place, and the tangible and intangible heritage that exits therein. The observations herein have been based on the Aksaray district in Istanbul, but numerous other studies demonstrate that they are equally applicable in many other cities in the world.

A displaced community's connection to its city/country of origin, along with the construction of new (negotiated) identities has also been studied within the framework of 'cultural studies' and 'identity and memory'. Using of urban space in order to protect culture and identity of the exciting ones while the new one is structuring is one of the important tools tracing the transformation itself.

This study can be considered as a pilot study for selecting certain points of focus for further studies, which will ideally entail the prolonged engagement of the community, and an in-depth analysis of its mode of being, the relationship they have with the district in which they live, and how they transform it so that it feels more like "home".

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HOMO GRAVITAS

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ABSTRACT:

The paper deals with human condition, gravitationally regarded from the perspective of Cultural Heritage. The secrets of the universe unlocked by Stephen Hawking at the end of the 20th century were received with great hope worldwide. Later he admitted that the mystery of gravity could not be disclosed. Since the case persisted, in 2017 he asked for a 'world government' to prevent *AI* from destroying the human race. Looking back, history has shown that *homo erectus* had a natural evolution. The transitory process of acquiring consciousness by receiving a mind passed discretely. It was recently proved that the Sphinx in Egypt is a memorial devoted to that event. Then, the Legend of Oedipus disclosed the true identity of *homo gravitas*. Meanwhile other legends were decrypted. An advanced gravitational civilization was created on the Earth along a few millennia. Unexpected problems arouse by the growth in population. At the end of the 19th century Nietzsche asked for a Superman. A few decades later, in 1907, Brancusi carved in stone a little sphinx statue as though bewilderedly asking *Quo Vadis?* Thirty years later, in 1937, the same sculptor gave a revolutionary solution to the control of the body-mind equilibrium. That solution gives a true answer to Hawking's request.

Key Words: Body, Congruence, Equanimity, Mind.

Hawking, from ecstasy to concern

At the end of the 20th century the book "A Brief History of Time" produced a boom in the scientific world. For the first time the secrets of the universe were unlocked. Five years later Hawking disclosed his expertise in the science of gravity by

presenting some fascinating ideas about the black holes. A black hole is "*a region of space-time from which nothing, not even light, can escape because gravity is so strong*". Further, in his "Illustrated Brief History of Time", Hawking described the four basic forces of the universe: 1) the gravitational force, 2) the electromagnetic force, 3) the weak nuclear force, and 4) the strong nuclear force, with the hope to achieve a grand unified theory, the so called GUT. Finally, in his book "The universe in a nutshell" Hawking expressed his optimism regarding to the unification of the four basic forces. In the same book he presented a suggestive diagram of the explosive growth in the world's population. It started after the industrial revolution that had occurred in England around the year 1750. It is worth noting that a good part of the English steel produced then was used in Paris for erecting the Eiffel Tower in 1889 as a Memorial devoted to gravity (Sofronie, 2001). Then, suddenly and unexpectedly, after only four years, in his "Theory of everything", Hawing wrote that all hopes for GUT failed because the force of gravitation remained undisclosed (Hawking, 2005). It was the centenary year of Einstein's Theory of Relativity. In spite of the intensive experimental tests made in the large hadron colliders of Geneva and Manchester Laboratories nothing changed. The gravitational force remained a great unknown. The story of God's particle was only a kind of joke. On March 9, 2017, referring to the dangers of artificial intelligence and technology, Hawking declared for **THE INDEPENDENT** in London: *"This aggression may destroy us all by nuclear or biological war. We need to control this inherited instinct by our logic and reason."* On that occasion he asked for the protection of a 'world government'. In its editorial dated on May 22nd, 2017 OSHO Times International also took a firm position by the statement: "*meditation or bust*."

Homo Erectus

According to Anthropogenic Sciences, the quadruped hominids passed through a process of evolution counted to twelve centuries. The bipedal condition of *homo erectus,* with enlarged feet soles, was reached at the end of the Pliocene era, about the year 500,000 BC. That major qualitative leap was possible only thanks to gravity. Gravity replaced the function of two of the four legs in controlling the static and dynamic equilibrium of hominid bodies. Thus gravity was incorporated as a new sense in the genetic program of *homo erectus,* beside the former five ones, remaining as such forever. In the subsequent cultures that followed the turning year 500,000 BC *homo erectus* passed through the advanced positions of Neanderthal man in the year 70,000 BC and Cro-Magnon man in 35,000 BC, while the year 15,000 BC marked its

migration to the Americas across Behring Straits. It was Robert Bauval who found out the *First Time*. He started to study the monuments at Giza in 1994 and decrypted an inscription on a large stone, he had discovered located between the lioness paws of the Sphinx. Bauval reached to the conclusion that the beginning of time, or *Zep Tepi* in Egyptian Mythology, occurred in the year 11,451 BC. The Milky Way and the course of Nile mirrored each other at that time. It seems that Plato also has referred to that time, when consciousness was fixed in solid matter, in his book *Timaeus*. Bauval mentioned that the building projects along the Nile River were cyclically repeated within a period of 1,460 years beginning with the year 11,451 BC. The Sphinx might have been carved in the raw rock existing on that location before the year 10,000 BC because the walls surrounding the monument displayed signs of water erosion that could not have happened after that time. The Sphinx marked the end of the Age of Metamorphosis when the organizing principles of the universe became irreversibly absorbed inside the human body and guarded it against any slide back into the old ways of procreation. That spontaneous process of matter precipitating out of mind lasted only for a brief interval of time and was never repeated during the history. of mankind (Black, 2007).

ANCIENT CULTURES AND LEGENDS

Oriental Cultures

Modern philosophy admits that matter and mind are not contemporaneous with each other. Two opposite alternatives are thus possible: either the matter had already existed, and the mind was later attached or the existing mind created the matter, after a while. By lacking some physical proofs, consisting in facts not words, both alternatives are nowadays theoretically supported. When the human body was considered as matter, the ancient Oriental Cultures took the evidence as basis and confidently adopted the first alternative. Therefore, at the time when *homo erectus* spontaneously received a mind and became conscious, its physical body had a life experience of 500,000-11,451 = 488,549 years, i.e. almost half a million years. The human body was already mature at that time. That is why it was in the Oriental Cultures that they first met; the body and the mind appeared like playing the roles of the old host and young guest. The body is made of earthen matter with its two basic properties: 1) gravity and 2) inertia, has only a single life and then disappears as a mortal thing forever while the mind, just like the soul too, has an immaterial or spiritual identity, comes from nowhere when the body is born, and then disappears in

the same nothingness when the body dies. The mind is very likely to have innumerable lives as a thing with an immortal identity, but this statement has not been practically proved yet.

Regarded separately, the body came to that meeting supported by solid references of autonomy and independence. The body was endowed with some vital organs for reproduction, digestion, circulation, breathing and coordination. All these organs and their accessories work together, like a complex machine to produce and consume vital energy. By supporting all these activities, the body is the greatest miracle ever created on the Earth. Each individual body is unique in the world and constitutes a universe in itself. The body has its own discipline and coherent rules of function in harmony with everything around, more or less close. That is why the body always lives and activates only in the present time, never in the past nor in the future. The body is also endowed with its own instincts controlled by the vital organs and senses. Since the matter of the body has originated from the Earth, the body's own wisdom has been inspired by the wisdom of the Earth. As long as the body life is concerned, it is nothing else but a form of vital energy. It lasts as long as the body's own production of energy is higher than energy consumption and ceases in the contrary case. With such a solid infrastructure the body's existence seems perfectly definite. It looks like that nothing is missing. The body detain all the mysteries and secrets of the life. To be known they should only decrypted. The question is who should do that decryption? The body does not speak any language, does not laugh or cry, does not sing or dance, and so on. Providentially, the mind came as a guest and totally dissolved into the body like a spice, essentially changing its life. The body and the mind melt into each other so intimately that any demarcation between them does not exist any longer. Symbolically, the mind is the body's internal content, while the body as host is the mind's external envelope of protection. However, the partnership between the body and the mind is far from perfection. For instance, the mind acts only in the past and the future, never in the present like the body. There are frequent asynchronies between them. The mind is a permanent source of noise. Also the mind is often produces amounts of undesirable thoughts that load the body in vain. And what is worse the mind creating an ego as a false substitute for the real being. This ego is a kind of thorn in the body's heel, a permanent source of conflicts between body and mind. In spite of these inconveniences, always unexpected, the material body is further submitted to the physical laws of matter, including Newton's laws of motion, while the immaterial mind further obeys the psyche's laws. The human being as a whole is absolutely connected in itself. The body is connected with the mind, and then, together, the body

and the mind or the *soma* and the *psyche*, are both connected to a transcendental soul hidden deep into the being (Osho, 2003).

The Legend of Oedipus

The Greek Sphinx asked Oedipus a riddle: 'What walks in four legs, then two legs, then three legs?' The Sphinx would have killed him if he had not been able to answer it, but he correctly interpreted it as a riddle concerning the ages of man. A baby walks in four legs, grows up to walk in two legs, until so old that a third leg, or walking stick, is needed. By this answer Oedipus communicated to mankind that in human life gravity plays the role of the stick providing the vertical stability. At that very moment *homo erectus* became *homo gravitas* and it has still preserved this Latin appellative until now. Oedipus was indeed the first *homo gravitas*, but the Legend also mentioned two facts: 1) Oedipus solved the Sphinx' riddle under death threat, and 2) Oedipus himself killed a man that was later proved to be his own father. According to some statistics *homo gravitas* carried out 5,000 wars during the last 3,000 years. The legend's message: *homo gravitas* is a warrior.

The Legend of Narcissus

In Greek Mythology Narcissus was a young hunter known for his beauty. After seeing his own image reflected in the water of a pool he apparently fell in love with it. Unable to leave that image of his reflexion Narcissus lost his will to live. He committed suicide by starring at his reflexion until he died. An ancient Greek superstition mentions that it is unlucky or even fatal for someone to see one's own reflexion for too long. In a paper published in 1914 Sigmund Freud called the case a *personality disorder*. In his book *Republic,* Chapter 13 "Poetry and Unreality", Plato claimed that reality and truth could only be seen by mirroring. In these conditions the image seen by Narcissus was that of a body free of gravity and also free of mind. He committed suicide not for the love of himself or of someone else, but for fear. As a hunter he was unable to understand what happened with his image and suddenly, without a mind, he felt lost, unable to find a way back. The legend's messages: 1) Gravity and mind have the same structural nature, and 2) By mirroring both, the gravity and the mind, can be controlled by *homo gravitas.*

The Legend of Adam and Eve

This Biblical Legend is perhaps the most beautiful one ever written. Adam was a man endowed with all the vital organs to live autonomously. He was lacking only a motivation of living. In author's view Eva, he received as a complementary part of his body, was not a woman, but mind. By its nature the mind is curious. Despite the prohibition to touch the tree of knowledge the sly snake deluded the mind to urge Adam to taste the forbidden apple. At that moment Adam learned what is good and what is bad, as it was foreseen for him, but instantly he was punished by losing his immortality. Together with his wife, later detached from owns rib, they were chased away from that holy place, cursed to work hard all their lives, and their remaining to return into the earthen soil where they had come from.

The Legend of Diogenes

Diogenes was a Greek philosopher. He was born in Sinope, Turkey, in 412 BC and died in Corinth in 323 BC. He was known as Diogenes the Cynic, and once met Alexander the Great (356 -323 BC). Plato (428-348 BC), a student of Socrates (470-399 BC) and a teacher of Aristotle (384-322 BC), called him "A Socrates gone mad". With such fame Diogenes became a Legend in itself. There are two reasons why this Legend has been chosen for this chapter of the paper. The first one is because Diogenes was a good looking man in his youth. He was conscious of his beauty and he used to appear naked in public. He mentioned that he loved his body and praised it for its internal and external virtues. It was a shame to hide a great creation like the human body behind clothes, he used to proclaim in public. The second reason is because when Diogenes got old he used to carry a lit lamp in the daytime claiming he was searching for light. It was obviously a paradox about which Albert Einstein stated that "No problem can be solved from the same level of consciousness that created it." Particularly, the nature of gravity cannot be decoded with the aid of gravity. The legend's messages: The previous message is confirmed, *homo gravitas* cannot find the gravity.

FRIEDRICH NIETZSCHE

Zarathustra

Zarathustra in Old Persian and Zoroaster in Greek, was probably a priest. It is unclear when and where he was born. He is said to have received a vision from the *Wise Lord* who appointed him to preach the truth. Zoroaster began preaching his message of

cosmic strife between the God of Light, and the Destructive Spirit, who embodies the principle of evil. According to the prophet, man had been given the power to choose between good and evil. The end of the world would come when the forces of light would triumph, and the saved souls would rejoice in victory. This dualism was part of an evolution towards monotheism in the Middle East. Zoroaster's teaching became the guiding light of Persian civilization. After Alexander the Great conquered the Persian Empire in 330 BC, destroyed Persepolis and moved its Capital to Babylon, Zoroastrianism began to die out in Persia, but it survived in India where it became the basis of the Parsi religion**.**

Of the Spirit of Gravity

In the human mind the usual perception of gravity comes from the flight of birds. Humans cannot fly alike because they are not weightless. Even the ostrich, the bird that runs faster than any horse, cannot do it and sticks its head heavily into sand, as if ashamed. On the other hand, humans call earth and life heavy. That complaint generates the Spirit of Gravity. The one, who wants to become light like a bird, and virtually fly, experiencing that special feeling of real flight, must love oneself with a sound and healthy love, disregarding all the conventional rules issued by society. The one who wants to learn how to fly a real flight one day must first learn to stand and to walk and to run and to climb and to dance. One cannot learn to fly by flying! Everything should be done in a personal way without any pattern, model or guide previously followed by someone else. The Spirit of Gravity bears a subtle key of joy and happiness in life. With the aid of the Oriental Ancient Philosophy Nietzsche expressed his brilliant ideas that proved to be, astonishingly actual after more than a century. It was a successful mediation between the two philosophical worlds (Nietzsche, 1969)

Of the Higher Man

After three metamorphoses, when the spirit successively passed from a camel to a lion and then to a child, man was created. Then by lightning, a heavy drop from the cloud became Superman in an instance. Despite all the imperfections, that man became a rope. A rope over an abyss fastened between animal and Superman. The Superman bears the meaning of the Earth; it has nothing to do with extra-terrestrial space. The man is a bridge not a goal; he is only a going-across. The Higher Man is a tight-rope walker, balancing not only great aspirations, but also responsibilities. First of all, he

should be honest and non-liar. Beside other virtues the Higher Man should learn how to be a great laughter and a good dancer too. Laughing sincerely, from all heart and beyond oneself is expressing the joy of life. The same feeling is experienced by dancing. This idea was painted by Henri Matisse in 1909. Later, Mircea Eliade, professor at the Chicago University, explained that by rotating like all cosmic bodies, the dancer demonstrates that s/he belongs to the universe as an intrinsic part of it (Eliade, 1991).

BRANCUSI, THE WISDOM OF THE BODY

Brancusi arrived in Paris in 1904 at 28. At that time the city where Guy de Maupassant had that terrible obsession of the Eiffel Tower was in full blossom of modern culture. Coming from a Romanian patriarchal village with a quiet life, Paris suddenly opened unexpected doors of creation to him. During the years 1905-1906 he was admitted to the École nationale supérieure des beaux-arts, and at the beginning of 1907 he spent two months only, as practicant, in Rodin's Studio. On March 27, 1907, then aged 31, Brancusi moved to 54 rue de Montparnasse, where he started to work on his own by the technique of directly carving in stone. The two miniature statues he created the same year were named The Kiss and The Wisdom of the Earth by Brancusi himself. The first statue, whose only name was inspired by Rodin, with dimensions of 28x2.1x21.8 cm, Brancusi used his concept of congruence or mirroring for the first time as it was later extended to The Gate of the Kiss in his Sanctuary at Targu Jiu (Plato, 1994) (Fig. 1).
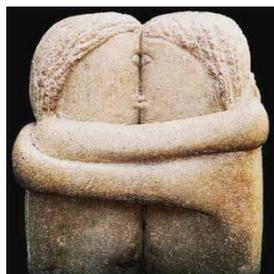
Figure 1.'The congruent Kiss'

The second statue, carved in crinoid limestone, with the dimensions of 56.5x16.5x24.9 cm, remained wrapped in mystery for a long time. A paper written two years ago made the first attempt to disclose the puzzle of this statue 108 years after its creation (Sofronie, 2015). The author then assumed that in 1907 Brancusi was still under the strong impact of the new environment of Paris where he had moved. Probably then, he felt in his sub-consciousness rather than understood, as he was a

feeler with an advanced intuition, that something was wrong with the human body. If so, before receiving a mind *homo erectus* behaved autonomously by using its own instincts only. In the case of *homo gravitas* the mind was located in the brain that radically changed the internal functions of the body. In order to keep the equanimity between body and soul, so often claimed by Somerset Maugham in his writings e.g., a different kind of head was necessary. That is why author's presumption that it represents a sphinx is well supported. A sphinx is nothing else but an enigmatic personage. The Egyptian Sphinx was made up of a lioness body with a female head and fixed as a statue. The Greek Sphinx had the same components, but it was mobile and acted like a monster. In this case, with an inspiration of genius, Brancusi had different options. A naked female, in all its natural beauty, was chosen as a body. It represents the roots through which the human being is connected with the Earth. As concerns the head he probably decided to symbolically replace the usual human one with a well-balanced body like the Globe of the Earth, sculpturally adapted for his statue. The head, as a crown, controls the body's equilibrium in the gravitational field and connects the body to cosmic energy. The sculptor carved a mask of a meditating sad face on the head (Fig. 2). Thus he created a statue that appears to be deeply concerned like that of a watching sphinx, as if asking *Quo Vadis?* Since the body was originally created from the Earth's soil, the statue actually represents the wisdom of the body and its conservation instinct. By that question the sculptor claims the body's right for its own wisdom to be preserved and not violated by the mind.

Figure 2. 'The Wisdom of the Body'

BRANCUSI, THE WISDOM OF THE MIND

In 1935 Aretia Tatarescu, the President of the National League of the Women of the Gorj County, asked Brancusi to create a War Memorial in the mining town of Targu Jiu, not far from his birthplace. It was supposed to be a Memorial devoted to the soldiers killed during the First World War, in October 1916. The work on the site started early

in 1937, and was completed one year later, on October 27, 1938. But eighty years ago the Column was erected in only three months, as the only Endless Column in the world. For his latest sculpture masterpieces Brancusi used three advanced concepts of shaping as follows:

The first concept is that of anthropomorphism and refers to the stylization of human bodies. Traditionally, memorials like those erected for Trajan in Rome, Napoleon in Paris, and Nelson in London were built as massive stone columns, all over 30 m in height, each supporting a big statue on its top. Brancusi never imitated other creations. For the funerary monument at Targu Jiu his option was a slender column in a modular composition of less than 30 m in height. Along a steel core, a score of identical modules of coated cast iron was successively laid, one over the other, in the vertical direction of gravity. According to their statute of representing young heroes, the modules were shaped like stylized coffins. Each module was represented by an isosceles decahedron with four vertical plans of symmetry and a horizontal one in the middle. That decahedron satisfied the topological theorem of Euler between facets, peaks and edges $F+P=E+2$, namely $10+12=5x4+2$. The height of each module was 180 cm; the middle square was 90x90 while the two end squares were 45x45, following the proportion 4:2:1. Owing to the existing horizontal plan of symmetry each decahedral module could be regarded as composed of two identical hexahedral units. They were used by Brancusi in composing the column by 15 full modules and 2 halves located at the two ends, which was equivalent with 16 modules. By adding a short guard length at the base of the Column its total effective height was h=29.35m. Therefore, from an anthropomorphic perspective, the Memorial Column consisted in a row of 16 standing identical coffins.

The second concept is idiomorphic and is related to the perfection of shaping. In the theory of aesthetics, the unit used for measuring the perfection of monuments, and thus for evaluating the beauty of human creations, is the golden mean or triangle, also called the sacred proportion, $\phi=1.618$. It was used, for instance, for the Cathedral Notre Dame of Chartres in France (1134-1220), but also to for the Petrindu Church in Romania (1612). In the case of the decahedral module created by Brancusi on each of its facets, four golden triangles were identified. That means that only a single module contained 4x8=32 golden triangles, while the whole Column was based on 8x8x8=512 golden triangles. This remarkable figure explains why Brancusi asked for his Column to be painted in a golden yellow color. By comparison, the Keops Pyramid at Giza, Egypt (2601-2515 BC), which geometrically is a pentahedron, and

also satisfies Euler's theorem 5+5=8+2, contains only four golden triangles, located two by two in the vertical plans of symmetry, perpendicular to the base sides. A surprise came from Mesopotamia. The reconstituted dimensions of the former Babel Tower, erected as a ziggurat probably by the King Hammurabi the Great (1792-1750 BC) were 90x90x90 meters and they coincided with Brancusi Column's hexahedron of 90x90x90 centimeters, precisely at the scale of 1:100. This means that the Babel Tower contained 4x4=16 golden triangles which explains its worldwide and long lasting fame. As far as the Column height was concerned it was not randomly chosen at all. It is easy to observe that 16 modules meant 10ϕ, with an error of only 1.125%, which proves the golden choice of the Column height. But what is really amazing is that the height h=29.35m adopted by Brancusi for his Column at Targu Jiu differs by less than 1% in the diameters d=29,426m of the two megalithic circular sanctuaries at Stonehenge, UK and Sarmizegetusa, Romania. In addition, since both the Eiffel Tower in Paris and the Keops Pyramid in Egypt are monuments devoted to gravity, the height of the Endless Column at Targu Jiu was 1:10 of Eiffel, 1:5 of Keops and 1:3 of Babel. Therefore, the idiomorphic concept of shaping the Endless Column was fulfilled.

The third concept is that of auto or isomorphism and explains the unique quality of the Column: that of being endless. In composing his Column out of decahedral modules Brancusi has used the topological law of self-generating the forms based on congruence or the well-known mirroring effect. Indeed, after repeating the congruence of the modules several times, the topological law of isomorphism came in force consecrating the endless feature of the Column. In fact, the mirroring effect caught the attention of thinkers long ago. For instance, in Egyptian Mythology the beginning of time *Zep Tepi* was marked in the year 11,451 BC when the Milky Way and the Nile River perfectly mirrored each other. Later, in his book *Republic,* Plato (429-347 BC), recommended to all artists to use looking glasses in doing their creations. A much stronger influence of that effect on humans came from the Myth or Legend of Narcissus. According to Greek Mythology, *"Narcissus saw his own reflection in the water and fell in love with it. Unable to leave the beauty of his reflection, Narcissus died".* A classic version of this legend was included by Ovid in his *Metamorphoses*, and in modern times, Oscar Wilde wrote *The Picture of Dorian Grey.* Although Brancusi never confessed, it seems he was the only human being in the world who clearly understood that the beauty seen by Narcissus in the pool came not only from the lack of gravity, but also from the lack of mind control. Any human body liberated from the confinement of gravity and mind control, feels the display of

a brighter mirrored image than the original one. It looks like the mirror bears the key to liberation and immortality. Thus Brancusi discovered exactly what he arduously needed for, in reaching the target of his Memorial: keeping the bodies in coffins symbolically and allowing the souls to leave the material space along the visible unlimited way, opened by the repeated congruencies of the modules. Brancusi expressed his art by *Geometry*, but he consequently created through *Topology*. Therefore, the concept of auto or isomorphism has a strong support in history and it definitely proves that topologically the Column erected in 1937 is really endless. Afterwards Brancusi did not create anything else. He passed away 20 years later in Paris, content that he fulfilled his duty on Earth (Fig. 3).

Figure 3. 'The Wisdom of the Mind'

The recent tests carried out on the shaking table of INCERC Iasi, showed that the Column's model did not develop any phenomena of dynamic amplification under the whole spectrum of seismic excitations. In addition, the test carried out on the Column's model in the Wind Tunnel of the Yokohama National University in Japan, identified the rare phenomenon of "aero-elastic indifference". Owing to the regular variations of the Column cross-sections Karman's alternate vortices were inhibited and did not appear at all. Considering the two types of tests one can state that the Column is not only endless, but also everlasting (Sofronie, 2013). From the perspective of *homo gravitas the* Endless Column is a creation of the conscious mind. But it is well known today that the conscious mind has three forms, namely individual, collective and cosmic ones. Additionally, each of the three forms has two more components namely a sub-conscious and a super-conscious one. Therefore, there is a

total of 3x3=9 forms of the conscious mind contributing to the act of creation performed by Brancusi. Indeed, if the Endless Column is carefully examined its nine-dimensional degrees can be identified. That is why it was the convention to adopt the name of 'The Wisdom of the Mind" for the right understanding of the idea of this paper only. Thus the work of Brancusi extended over 30 years, between 1907 and 1937, from the Wisdom of the Body to the Wisdom of the Mind becomes perfectly coherent and entirely fulfilled.

BRANCUSI SANCTUARY AT TARGU JIU

The Sanctuary is developed along a West-East axis of 2.5 km in length, from the bank of Jiu River to the former hey market, and crosses the Public Garden of Targu Jiu town. The Alley of War Heroes such created successively contains: 1) The Table of Silence, 2) The Alignment of the Stools, 3) The Gate of the Kiss, 4) The Orthodox Church devoted to Saint Apostles Peter and Paul, and 5) The Endless Column. Each group of sculptures was created and located by the sculptor in full accordance with its function. For instance, the Table of Silence, together with its 12 surrounding Stools, was devoted by the sculptor to the silence of the mind. But human mind is eternal, like gravity, without a beginning and an end. Its life is circular. That is why the Table and all its Stools are also circular as shape. The Table consists in a slab of limestone with 2.15 meters in diameter and 0.43 m in thickness, supported by another slab also made of limestone of 2.00 meters in diameter and 0.45 m in thickness. The Stools were carved in the same rock as the Table and shaped like circular clepsydrae. Initially, the Stools were disposed in pairs, closer to the Table edge. Later they were rearranged at the present distance at equidistant spaces between them. Before the regularization of the nearby river the waters flowing from the mountains created a comforting ambience. The Alignment of the Stools connects The Table of Silence with The Gate of the Kiss. The Stools were designed by the sculptor for the bodies to rest. But the human body is ephemeral; it has a beginning and an end. Therefore, its life is linear. That is why all Stools of the Alignment were shaped like squared clepsydrae. They are arranged in five groups of three Stools on each of its two sides, all carved in limestone and shaped as squared clepsydrae. There is a total of 2x5x3=30 identical Stools. The Gate of the Kiss, massive like a triumphal arch, appears as a conceptual development of the statue created by Brancusi in the memory of Tania Rachevskaia in Montparnasse Cemetery of Paris in 1910 as a congruent and gravitational Kiss. Those 40 images of the statue carved in travertine suggest the fascinating idea of the kiss by perfect superposing two by two of the involved faces, according to the vertical

direction of gravity, also including the eyes. The perfect horizontality of the embrace emphasizes the gravitational orientation of the whole monument. In turn, The Endless Column is composed of a succession of identical metallic modules, all connected in series, as a funeral monument. When the erection of all modules was completed under his supervision, Brancusi asked the workers to paint the Column in the yellow colour of the ripe wheat fields.

The late architect Silvia Paun ascribed a megalithic stylization to that Memorial of modern art. She identified the Table of Silence and its twelve Stools with a *Cromlech* or a Circular Temple of *Menhirs,* the Alignment of Stools with a horizontally extended Linear Temple of *Menhirs*, The Gate of the Kiss with a *Dolmen*, and The Endless Column with a vertically extended Linear Temple of *Menhirs*. Once these functions were recognized as such, the Targu Jiu Memorial was integrated with other vestiges of World Megalithic Cultures like Carnac in France, Stonehenge in Great Britain and Sarmizegetusa in Romania. It was for the first time in History when modern sculpture at such large scale reflected so faithfully the ancient art expressed by stone not only in shape, but mainly in the meaning of their messages (Paun, 2001) (Fig.4).

Figure 4. Megalithic stylization of Brancusi Sanctuary

For thirty years, from the Kiss in 1907 to the Endless Column in 1937, i.e. in all his creative life, Brancusi also used the congruence for the circular clepsydrae of the Table of The Silence, for the squared Stools of The Alignment of Stools and for The Gate of The Kiss; once perpendicular on the direction of gravity and four times parallel with gravity. In all cases his works received a particular purity by eliminating the mind. That subtle effect is not because the mind would be impure. Not at all; it's only the onlookers' different lengths of waves that make the difference. By mirroring, the images lose their gravity at the same time with the mind. This effect suggests that mind and gravity have the same immaterial composition. That is why the mind has not been able to disclose the nature of gravity so far, to Hawking's disappointment. It seems that many years ago, in ancient time, when the wise people who wrote the Bible, they knew that *homo gravitas* was not yet prepared to handle gravity properly. Indeed, even when the atomic and nuclear forces were discovered,

less than a century ago, they immediately received military destinations as well. On the other hand, it has been known for long time that for *homo gravitas* the standing position is essential for *homo gravitas*. Indeed, in the vertical direction the body is parallel with the lines of the gravitational field. Then miraculously the induction of the gravitational energy in the human body reaches maximum values. That energy, also called cosmic energy, induced directly in the body, but not in the mind, means life and vertical stability. On the horizontal direction the induction of gravitational energy in human body ceases, and death may occur. *Homo gravitas* is a complex energetic machine that normally works only when the body and the mind are balanced. The law of universal gravitation postulated by Isaac Newton is equally valid on all planets. The only difference consists in the intensity of the gravitational field.

Conclusion

Homo gravitas is neither a man nor a woman. It is the archetype of the biped endowed with a conscious mind. Its body originates from Earth while its mind originates from gravity. The UNESCO World Heritage proudly preserves its achievements. The 21th century has started with great expectations from *homo gravitas*. Despite the unequal development of the body-mind couple, the potential of *homo gravitas* to keep its balance remains high. Its inner self universe is still carefully explored. Practically, this task lies in putting its mind under self-control. The balancing solution proposed is based upon the mirroring effect discovered by Plato. Brancusi, the sculptor of genius, controlled the mind by repeated congruencies. His idea can be extended to all the nine levels of mind: individual, collective and cosmic, each as conscious, subconscious and superconscious one. Gravity is the common propriety of body and mind. *Homo gravitas* has to discover how the body-mind couple manages the matter's resources of energy. Additionally, *homo gravitas* should recover the body's ancient abilities as direct, non-verbal, communication, courage, innocence, doubt, purity and accuracy of the original five senses. By self-balancing, the psychosomatic body-mind couple aspires to reach its equanimity. Keep standing, *homo gravitas!*

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EVALUATION OF THE BIRTHPLACE OF MIMAR SINAN, AĞIRNAS AS CULTURAL HERITAGE AND THE RISK OF LOSS OF HERITAGE

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Abstract

A world famous architect, Mimar Sinan, who lived in the 16th century, also considered to be an engineer and material expert, and produced up to 365 architectural works including Süleymaniye Mosque and Selimiye Mosque etc. was born in Ağırnas. Ağırnas is a town in the province of Kayseri, Turkey. Stone materials and craftsmanship used in houses and underground settlements considered to be used between the 1st and 13rd centuries A.C. are prominent in Ağırnas, mainly populated by the Greek in the past. The cultural heritage of Ağırnas is at risk of extinction because of gradually diminishing population. This study is going to explore civil settlements, religious buildings and underground cities located in Ağırnas as potential architectural asset and methods are going to be recommended against the loss of cultural heritage.

Key words: Mimar Sinan, Ağırnas, cultural heritage, risk

History of Ağırnas

Ağırnas is a settlement area that has been apparently hosted by people from at least 3000 years ago with its tunnels, caves and underground city ruins. Ağırnas has been registered in the cadastral record books belonging to the Ottoman period year 1500 as a considerably large village both in terms of population and economy based in Kayseri with its 53 households of Christian (Gebran house), 3 households of Muslim population, 2 mills, 2 linseed oil house. 95% of the village population was composed of Greeks in the past. There are 14 households of Muslim and 28 households of

Christian population in Ağırnas according to 1834 records. However, majority of Ağırnas population was Muslim in 1875 census. By reason that the village land is barren and volcanic so that is not eligible to obtain high level of production, people tended to rely on other fields of occupation earn their livelihood. The fabrics woven in Ağırnas was at the top of the list of products exported from Turkey to Britain during the 16th and 17th century. Particularly, the thin soft white cotton fabric called as "Ağırnas bull" was considered among most wanted commercial goods in great demand especially in Britain, France and Netherlands. This place was called as Taşören between 1923 and 2003, then it received the former name afterwards[50]. Ağırnas was made a town affiliated to Melikgazi district in 2012.

General characteristics of Ağırnas

Located in Kayseri province of Turkey, Ağırnas where Architect Sinan was born and spent his youth, that is famous with its original stone structures and underground cities and where the best stone masons of the region have been raised for centuries in fact hosts a second city that resembles an underground labyrinth in addition to brilliant historical houses. Hillsides of Ağırnas valley located at the foot of Erciyes mountain have an environment eligible to be carved easily and used for all kinds of functions being required because they are covered by white and red soft rocks called as "tuff"[51]. The ground floor of the house where Architect Sinan was born is opening towards mysterious galleries and living paces which interconnect all historical mansions underground located in Ağırnas[52]. There are similar underground living spaces under many registered houses at this place. Underground spaces are harboring places according to climate conditions which also serve as cellars because they are not affected by temperature even in very hot seasons. Moreover, there are different construction types because both Muslims and non-Muslims have lived in Ağırnas in the past. The fact that Turks, Armenians and Greeks have lived together, brotherly in unity and solidarity for years, mosques and churches are located on the same street are good examples of tolerance in Ağırnas [3]. A number of buildings draw attention with unique stone masonry and architectural characteristics in Ağırnas. Stone masonry is very successful in all structures. The names of former owners carved on stone are apparent on the entrance of some houses[2]. Some of the historical linseed oil houses

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[50] tr.wikipedia.org

[51] www.tarihten dersler.com...

[52] www.radikal.com

which have been utilized for linseed oil production are still existing in the village. There are two monumental fountains which are specified as having been constructed by Architect Sinan in Ağırnas. Ağırnas is a cultural heritage required to be protected with its stone houses, underground cities, caves, tunnels, churches, linseed oil houses, stone churches, pigeon lofts, water structures.

Fig.1 – Ağırnas underground city (Ağırnaslıgil-2015)

Fig.2 – White and red soft rocks called as "tuff"   and Ağırnas houses (Hattap-2012, Elmalıoglu-2017)
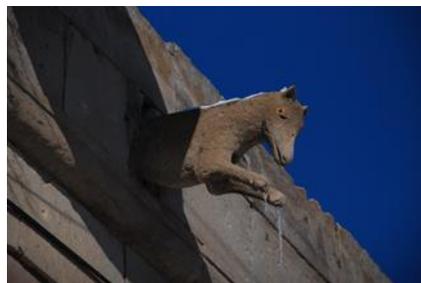
Fig.3 – Gargoyle (rain draining pipe) example that is rarely seen in Turkish architecture (Ağırnaslıgil-2017)

Architect Sinan

Having served as the head architect during the period of Ottoman sultans Suleiman the Magnificent, Selim II and Murat III, Architect Sinan (1490-1588) was born in Ağırnas village of Kayseri. He was brought to Istanbul by means of 'devşirme' (recruitment) during the era of Yavuz Sultan Selim. He was among elected architects because he was intelligent, young and dynamic. Sinan has aspired for architecture as a child who was given to the At Meydani (Hippodrome of Constantinople) palace, and desired to construct waterways and aqueducts on the gardens and vineyards of the country.

Architect Sinan examined architectural works of art by visiting the South Europe from Syria, Egypt, Iraq, Iran to Balkans and Vienna with the excursions he participated, then he created many works of art. Three works constructed by Sinan before he was assigned as the head architect are remarkable. These include Husreviye Social Complex located in Aleppo, Çoban Mustafa Pasha Social Complex located in Gebze and the Haseki Sultan Complex built for Hurrem Sultan located in Istanbul. Three great works constructed by Sinan after he became the head architect are just like the steps which indicate development of his art[2]. The first of them is the Sehsadebasi Mosque and Social Complex that is defined as the apprentice piece by himself. The second is the Suleymaniye Mosque and Social Complex located in Istanbul as his foreman piece. The third is the Selimiye Mosque and Social Complex defined as his master piece located in Edirne included in Unesco's world heritage list. Architect Sinan created 365 works of art including 92 mosques, 52 prayer rooms, 55 madrassahs, 7 darulkurra (madrassah section that taught tajweed in the Middle Age Islamic countries), 20 tombs, 17 imarets (alms houses), 3 darüssifa (hospitals), 6 waterways, 10 bridges, 20 caravansaries, 36 palaces, 8 crypts and 48 bathes [53].

Fig.4 – The source of inspiration for Mimar Sinan the historical underground arches of Agirnas

(Ağırnaslıgil-2015)

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[53] mimarsinan.gen.tr

The House where the Architect Sinan was born

The three-floored house where the Architect Sinan was born which was then turned into a museum located in Ağırnas by the initiative of Erciyes University in 2000 and contributions of Prof Dr. Metin Sözen and ÇEKÜL was completed with an official opening ceremony in 2007[54] .The stone walls of the house that has approximately 2500 square meters indoors area with the constructions next it and stone carved settlement areas are decorated by photographs of significant works of art of Architect Sinan. The basement floor of the house is opening to wide galleries, rooms and underground cities where the arches draw attention at entrances. Ağırnas Quarter gives some tips about the resource of the art of the famous master who put his stamp on the world history. The historical pattern in Ağırnas where stone masonry descends from father to son gives an idea about the atmosphere where Architect Sinan who has decorated the Ottoman geography with unique beautiful works was raised. It is presumed that grandfather and father of Architect Sinan were stone masons. The intellectual infrastructure of Architect Sinan's works of art has been formed here. Mastership of people living here in weaving and stone masonry has affected the aesthetic perception of Architect Sinan who lived his childhood here [3].

Fig.5 – Mimar Sinan House in Kayseri Ağırnas (Ağırnaslıgil-2017)

Consideration of Ağırnas as a cultural heritage and registered structures

The start of conservation and recovery works in Ağırnas settlement extends to 1970's.

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[54] Okyay, 2007

Many cultural properties have been registered and put under conversation at the stage of considering Ağırnas as a cultural heritage. Some of the works performed in this scope are as follows: Architect Sinan Memory House and Cultural Center is existing on Architect Sinan Street where the traditional pattern is mostly concentrated. This region was registered as the 1st Degree Archeological and Urban Protected Area in 2002. Moreover, some structures in the region were registered as a cultural property with their architectural and cultural characteristics. One of the most important factors that affect these registration decisions is that the structures are the pieces of the underground city on which they have been constructed. 10% of underground cities have been cleaned, lightened and opened for tourism as a result of cleaning and recovery works which have been ongoing since 2000 by means of Ağırnas Municipality's facilities. The works on other sections are ongoing. Agios Prokopios Church was registered as an immovable cultural property in 1999. Mustafa Bey Quarter where the district is located was registered as a 3rd Degree Archeological Protected Area in 2005 by reason of the underground city located there. On the other hand the graveyards located at the entrance of Ağırnas was registered as 1st Degree Archeological protected area in 2005. Several civil architecture example residences located in Ağırnas Village were also registered. The Underground City located in Akbin River Locality of Ağırnas Village was registered as a 1st Degree Archeological Protected Area in 1989. The Rock Settlement and Rock tombs located in Gölgebağı Locality and Sığıryatağı Locality were registered as the 1st Degree Archeological Protected Areas in 2005. Three monumental fountains specified as having been constructed by Architect Sinan were also registered as immovable cultural properties in 1995. Ağırnas Primary School which was completed in 1911 and functioned as Architect Sinan Library afterwards was registered in 1992[5]. On the other hand the stone quarries located around the settlement area were announced as the SIT (Protected Area) areas[3].

Conversation efforts performed in Ağırnas

Some conversation and restoration works have been performed by collaboration of municipalities, civil society organizations and university at Ağırnas in the past. Landscape planning of Agios Prokopios Church that had been constructed in 1857 and roof repair of which was performed by the facilities of Ağırnas Municipality was completed by April, 2007. The restoration of Historical Ağırnas primary School was completed and officially opened by April 9 of 2007. The determination and registration efforts about Linseed Oil Houses have been performed in scope of "July

2006 Summer Workshop of Respect for Sinan". In this context, surveying and restoration works have been started[5]. Several education institutions have also organized workshops in collaboration with Ağırnas Municipality which is not currently present and performed determinations by means of surveying with students. Mimar Sinan Fine Arts University organized a summer workshop in Kayseri- Ağırnas with the attendance of Architectural Restoration Program students in 2012. Some surveying studies have been performed based on civil architecture examples in Ağırnas, street silhouettes have been issued during the workshop, later on surveying and restoration studies have been completed in scope of Surveying III and General Restoration Projects courses under coordination of Assist.Prof.Dr. Sibel Onat Hattap who has taken part in the workshop. Çerkezoğlu Mustafa Bey Mansion, Arabic Association restoration works have been completed, fountains have been repaired, underground city landscape planning works have been performed and linseed oil production house has been cleaned. Use of stone quarries and rock spaces as cowshed in the past have created high risk. Then the stone quarries have been put under conversation.
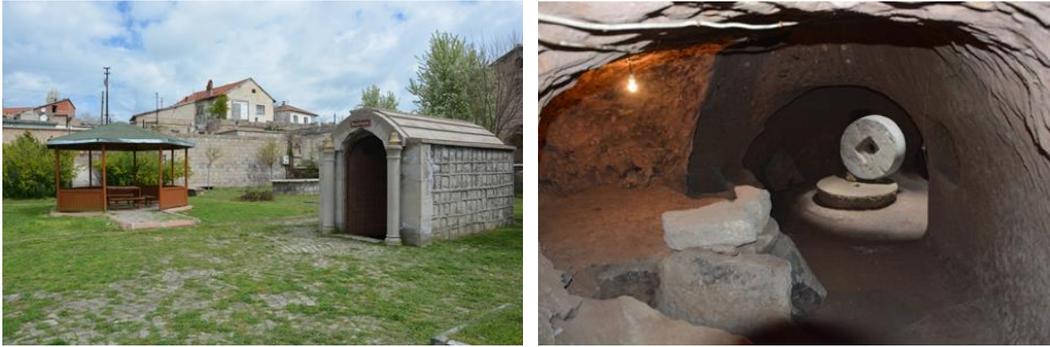
Fig.6 – Linseed oil house (Bezirhanene) that has been cleaned and repaired (Ağırnaslıgil-2017)

Conclusion

Conservation efforts are ongoing in Ağırnas town which was turned into a quarter affiliated to Melikgazi district in 2012 by collaboration of Melikgazi Municipality it is affiliated to. Restoration works have been performed in the underground city. Natural gas line is being established on the new settlement area of Ağırnas. Professional agriculture has been developed by means of irrigated farming in Ağırnas which has currently a population including nearly 3000 people. In addition to this, local people used to breeding 2-3 bovine animals in their houses in the past, while there are currently animal breeding farms from which some income is acquired with 300-500 animals. All these processes are positive developments to prevent locals from leaving

their houses each of which is a cultural heritage. However the lack of a high school in the town necessitates young people to Kayseri in order to continue their education. Underground cities existing below most of the houses are still being used for store, cellar etc. purposes. There are still some people who leave their house here and go to Kayseri to stay during winter[55]. In addition, the fact that the cement factory is still operating in Ağırnas positively affects the employment of local people. The studies conducted by Yıldız Technical University Faculty of Architecture in collaboration with architecture students[56] in 2008 and the workshop held by Mimar Sinan Fine Arts University with Architectural Restoration Program students in 2012 are the indicators evidencing that Ağırnas Quarter is valued and appreciated as a cultural heritage by the supports of several universities and civil society organizations, ÇEKÜL (the Foundation For The Promotion And Protection of The Environment and Cultural Heritage), Melikgazi Municipality. Currently, the Architect Sinan House is undergoing periodical maintenance, lighting works of the underground city are ongoing, and opening these places to visit free of charge are also positive efforts in terms of tourism contributions. However, Ağırnas located at 27 km distance from Kayseri is overlooked. The lack of any touristic accommodation here constitutes risk for architectural heritage loss. Acceleration of conservation efforts, use of some restored residences for accommodation such as restored Fuat Gökçen House, increasingly spreading promotion efforts about Ağırnas Quarter, completion of repair in underground cities and opening of higher number of sections for visit contribute in culture tourism while they will decrease the risk of heritage loss in Ağırnas quarter where the Architect Sinan's house is located.

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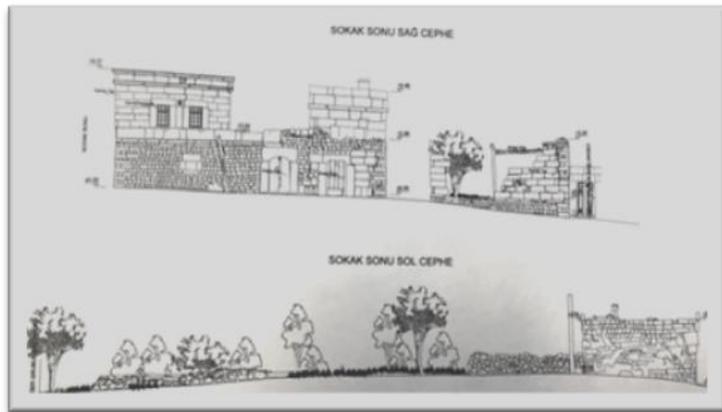
[55] Ağırnaslıgil, 2017

[56] Ünal, 2008

Fig.7 – Kayseri Ağırnas summer workshop and   relief works (Hattap-2012)

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A WISH LIST OF DRR AND DRM ACTIONS FOR CULTURAL HERITAGE

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ABSTRACT:

The implementation of effective actions for disaster risk reduction (DRR) and disaster risk management (DRM) in cultural heritage has been slow, despite the increase in awareness regarding the overall risks to cultural heritage and the several international initiatives recognizing the importance of cultural heritage for society. Although there are numerous reasons for this lack of tangible changes, a few practical topics are addressed herein. The selected topics require further discussion, research and development to achieve the successful implementation of DRR and DRM practices for immovable cultural heritage.

Key Words: Risk Management, Risk Assessment, Preparedness

Introduction

Numerous international institutions connected to disaster risk reduction (DRR) and disaster risk management (DRM) are increasingly echoing concerns about the protection of cultural heritage from disasters. Existing international frameworks and programmes for DRR emphasizing the need to develop and implement measures to reduce hazard exposure and vulnerability to disasters also recognize the importance of cultural heritage and its irreplaceable value for society. Furthermore, several

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* Corresponding author

initiatives have also started to recognize the importance of cultural heritage as a sustainable resource for economic growth and for addressing several societal challenges. Despite this awareness increase regarding the overall risks to cultural heritage, the implementation of effective actions for DRR and DRM in cultural heritage has been slow. Although there are numerous reasons for this lack of tangible changes, the current paper brings some attention to a few practical aspects that require further discussion, research and development to achieve the successful implementation of DRR and DRM practices for immovable cultural heritage. In particular, the paper will focus different elements of the risk management cycle that link with the mitigation and preparedness component of the disaster management cycle.

The disaster management cycle and the risk management cycle: a brief review

The disaster management cycle

Several terminologies are available to define and describe the disaster management cycle. Even though different fields of disaster-related practice use alternative interpretations of this cycle, most of them are very close and differ in minor details only. Among those, the definition of disaster management cycle that is selected herein is one that is simple, that incorporates all the fundamental steps and provides a clear connection with the risk management cycle. As such, the disaster management cycle is considered to be a three-stage process, as presented in Figure 1, that involves the following stages:

1. Mitigation & preparedness
2. Response
3. Recovery

Figure 1. The disaster management cycle

Even though mitigation and preparedness are usually seen as independent activities in several definitions of the disaster management cycle, they are in fact complementary and need to be carried out simultaneously. Therefore, they are considered to be in the same stage in the selected definition of the disaster management cycle. Mitigation involves actions attempting to prevent hazards from developing into disasters

altogether or to minimize the damaging effects of disasters. Preparedness, on the other hand, is a continuous cycle of planning, organizing, training, evaluating and improving activities to ensure the enhancement of capacities and an effective coordination to respond to and recover from the effects of a disaster. Mitigation and preparedness are a direct output of the risk management cycle that link with the disaster management cycle.

The response stage includes all the actions taken during or immediately following an emergency, including efforts to save lives and to prevent further property damage. Ideally, disaster response involves putting into practice a pre-established disaster preparedness plan. Finally, the recovery stage involves actions to return the impacted area to its pre-disaster state or better by restoring, rebuilding and/or reshaping it. This stage usually starts after damages have been assessed and adequate response efforts are achieved and ongoing.

The risk management cycle

As for the disaster management cycle, several definitions and terminologies are also found to describe the risk management cycle. Although different fields of risk management practice also use alternative interpretations of the several steps involved, the risk management cycle definition that is considered herein incorporates the essential elements. The risk management cycle is considered to be a five-stage process, as represented in Figure 2, that involves the following stages:

4. Risk assessment
5. Risk communication
6. Analysis and decision-making
7. Risk mitigation and definition of emergency measures
8. Control/monitoring and emergency training
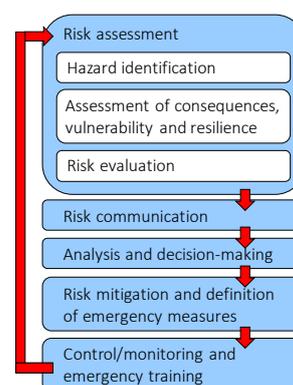
Figure 2. The risk management cycle

As can be seen from Figure 2, the risk assessment component of the risk management cycle comprises three sub-stages. These correspond to hazard identification, assessing consequences, vulnerability and resilience, and risk evaluation. The output of this stage is a risk value or classification that is then conveyed to stakeholders in the risk

communication stage. Therefore, efficient risk communication needs to involve risk measures that can be understood clearly by decision-makers. The analysis and decision-making stage is where the need for actions regarding a certain risk level is determined and where the type of action is gauged against potential losses using cost-benefit analyses and other criteria. The following stage has also two components: risk mitigation and definition of emergency measures. The first addresses the implementation of the risk mitigation actions that were selected in the previous stage (if any) and the second involves the development of emergency preparedness measures and processes to enhance the capacity to respond to and recover from a disaster. The final stage of the risk management cycle also comprises two components. The first is the control and monitoring of changes in the condition of the asset, including after the implementation of mitigation actions if such actions were defined. The second component involves the regular implementation of training activities addressing the emergency preparedness measures that were planned in the previous stage. Unlike the disaster management cycle that is only activated by the occurrence of a disastrous event, the risk management cycle needs to be regularly implemented to ensure an up-to-date risk assessment information and an adequate level of emergency preparedness. Furthermore, it also becomes clear that the outputs of the stage that defines risk mitigation actions and emergency measures corresponds to the link between the risk management cycle and the disaster management cycle.

DRR AND DRM ACTIONS for CULTURAL HERITAGE: a WISH LIST

As referred before, several practical aspects connected to the implementation of DRR and DRM in cultural heritage and that are believed to require further developments are addressed in the following. The various issues are seen as components of a wish list that, in the opinion of the authors, would support DRR and DRM practices in cultural heritage.

Do we know how much cultural heritage we are losing to disasters?

The availability of robust disaster damage and loss data is known to be essential for developing adequate risk assessment and management processes. Consequently, the development of systems, models and methodologies to collect and handle such data is becoming a worldwide priority. Disaster loss data frameworks such as the EM-DAT/CRED, the SIGMA/SwissRe, the NATCAT/MünichRe or the DesInventar/UNISDR databases are undoubtedly important sources of information in

terms of the damages and losses that occurred in worldwide disasters. Recording such data is known to be useful for the purpose of loss accounting, forensic analysis of disasters and disaster risk modelling (De Groeve et al., 2014). For example, this data can provide an objective baseline for vulnerability/risk assessment as well as for mitigation priority setting and decision-making. However, the data recorded by these databases does not include damages and losses to cultural heritage. Therefore, without this important component, current loss estimation procedures are not able to provide a sound and comprehensive quantification of disaster impacts. Currently, there is no systematic collection of data about the impacts of hazardous events on cultural heritage properties. Existing data on damages and losses to cultural heritage is scattered among various agencies (national and international) without any rationality and coordination. Furthermore, no standardized methods and tools have been developed for cultural heritage disaster data collection until now. Therefore, specific approaches and methods are required.

To address this issue, the International Committee on Risk Preparedness of the International Council on Monuments and Sites (ICORP/ICOMOS) and the Faculty of Engineering of the University of Porto developed the framework for a database with the objective of collecting worldwide data on immovable cultural heritage disaster losses (Romão and Paupério, 2016). This database would then be able to provide institutions managing and protecting cultural heritage with:

• a systematic and standardized recording of cultural heritage disaster-related data, from both natural and man-made hazards;
• a reliable accounting of cultural heritage losses;
• adequate data to analyse disaster trends and risk mitigation needs in cultural heritage.

One of the key issues of the database development was the definition of a simple system of categories for the type of cultural heritage properties that are considered. Although several classifications and definitions of cultural heritage categories can be found in the literature, no approach was seen to be entirely satisfactory in order to accommodate different types of immovable cultural heritage assets in a simple, general and structured way. Therefore, the following system of Heritage Categories was developed which establishes the importance of a certain immovable cultural heritage item:

- UNESCO World Heritage Sites
- Properties Protected by the Hague Convention
- Listed National Heritage
- IUCN Protected Areas
- Properties of Local Significance

Given that some of these categories may overlap (e.g. a UNESCO World Heritage Site can also be a Listed National Heritage), more than one Heritage Category can be assigned to a cultural heritage property. For each category, an additional descriptor is also assigned to define the type of cultural heritage item. This descriptor establishes that a given cultural heritage item belongs to one of the following Unit Identification types:

- Single unit property: an individual monument or a natural landscape
- Multiple unit property: a group of monuments, an historic landscape, an historic town, an urban block of cultural significance

It is noted that within this classification for immovable cultural heritage, a museum building together with its collections is treated as a single unit property.

Hazardous events that can be recorded by the database range from small-scale events that only affect a single cultural heritage property to large and widespread ones that affect a larger number of heritage assets. The database is able to record basic identification and information about the main event (and secondary events that may have been triggered by the main event) such as the hazard type/subtype, the GLIDE number, geographical information (country, continent, location, latitude and longitude) and temporal information (start/end date, local time), (Figure 3). For each event, the database is able to record information about the cultural heritage properties that were affected, namely basic descriptions about them before they were damaged and descriptions of the damages and losses they suffered. The damage description can be illustrated using additional media such as photos, videos or reports that can be uploaded into the database. Each cultural heritage property affected by an event is then associated to a Heritage Category and an Identification Type (according to the previously referred classifications), to one or more Property Classes (e.g. religious facility, archaeological site, residential facility, landmark, nature reserve, park, marine zone, rock formation, etc.), to a Value (qualitative) and to one or more Construction Materials (only for built properties). In terms of disaster data, the database records the

(qualitative) damage level of each cultural heritage property, a loss of functionality/downtime indicator, available information on economic losses and data regarding emergency procedures that may have been activated following the disaster.

Even though the framework for this database was developed, populating the database is still fraught with challenges. Difficulties range from a lack of resources and funding to establish a team of analysts to search and process data and to manage the database, to the unavailability of sources willing to provide adequate data. However, given that the recently adopted indicators to monitor the global targets of the Sendai Framework for Disaster Risk Reduction include the need to report on cultural heritage losses (UN, 2016; UNISDR, 2017a), initiatives targeting the cultural heritage sector are expected in the near future. Moreover, according to a recent UNISDR Data Readiness Review (UNISDR, 2017b), the surveyed countries identified the need for financial resources, technology transfer and capacity building when asked to identify requirements needed to redress data availability gaps on cultural heritage losses. *As such, there is a clear need to address data collection on cultural heritage losses to support in-depth analyses of their impact and the development of efficient DRM strategies.*
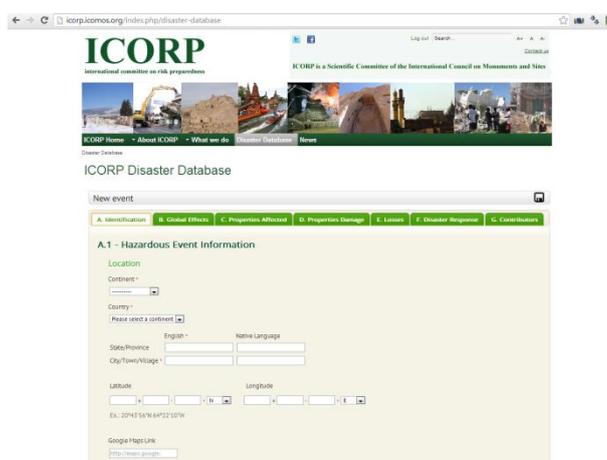
Figure 3. Main screen of the ICORP Disaster Database

Do we understand and know the risks to our cultural heritage?

It is believed that numerous cultural heritage assets require the implementation of risk mitigation measures. Still, developing such measures needs to be based on adequate knowledge about the risks these assets are facing. However, for most countries, carrying out multi-hazard risk analyses for a large number of cultural heritage assets requires efforts and budgets that are frequently unavailable. Therefore, assessing the

risks for a large number of assets with limited resources is only feasible when based on simple methodologies.

Risk analysis usually requires the probabilistic quantification of hazard and vulnerability. Probabilistic representations of those components require both sufficient/reliable data and adequate analytical/numerical procedures. Probabilistic hazard is usually defined using data from past events. For natural events such as earthquakes, floods, landslides or volcanic eruptions, a probabilistic hazard can usually be defined. However, there are fields for which establishing a probabilistic hazard is still complex mostly due to a lack of adequate data or models. For the case of vulnerability, its definition relies on the availability of procedures capable of forecasting the damaging/negative effects that a particular hazard may have on a certain asset under analysis. Although detailed vulnerability representations can be established in several contexts, for the particular case of cultural heritage assets, their complexity and the lack of knowledge regarding their behaviour in certain situations are often important obstacles to the detailed definition of their vulnerability. Furthermore, when the risk analysis addresses a large amount of assets, those difficulties are amplified due to resource-related restrictions that might also come into play. In such cases, vulnerability analyses often involve methodologies where simplified assumptions are made.

Despite the inherent complexity of modelling the vulnerability of cultural heritage assets, when defining a risk assessment procedure for cultural heritage assets, the availability of human, time and economic resources usually sets the boundaries of the scope and comprehensiveness of the risk analysis. Furthermore, it will also be fundamental for the successful regular update and monitoring of the risk assessment results over time. Therefore, when dealing with a large number of cultural heritage assets, it is important to have a simple methodology that can be used for the preliminary risk analysis of those assets to establish risk mitigation priorities or to identify assets requiring more detailed and resource-demanding analyses. In light of this, the use of a qualitative risk analysis approach is seen to be more adequate to fulfil these requirements. Even though qualitative analyses still involve analytical and evidence-based characterizations of the risk, they establish descriptive or categorical treatments of information instead of numerical estimates. These methods simplify the risk analysis by reducing the required inputs and calculations to a set of judgments. The simple risk categories that are produced can then be communicated to policymakers and stakeholders in a simpler way. Qualitative analyses are useful in

situations where theory, data, time or expertise are limited but they also provide adequate results when decision makers only need a qualitative assessment of the risk. Furthermore, they are also useful for cases where quantitative risk analysis is impractical. For example, the qualitative analysis of a large number of cultural heritage assets (e.g. nationwide) may be a suitable way to identify situations where a more detailed assessment is needed. In many situations, a qualitative risk analysis is able to provide risk managers or stakeholders with enough information for decision-making. For example, the gathered data may include sufficient evidence indicating that a given risk can, in fact, be disregarded. On the contrary, the gathered evidence may also point out to an unacceptably large risk, or to consequences of a given hazard so unacceptable that mitigation measures are needed whatever the level of risk.

To address these aspects, a simplified methodology for the risk assessment of cultural heritage assets was recently proposed (Romão et al, 2016). This approach can be used as a screening procedure for the preliminary assessment of a large number of cultural heritage assets with limited resources or for the preliminary identification of assets that require a more detailed and resource demanding risk evaluation. The methodology involves a qualitative risk analysis based on a set of structured assessment flowcharts (Figures 3 and 4) addressing the main components of a risk analysis: the likelihood of the hazard, the consequences of the hazard, the vulnerability and the loss of value of the asset and, finally, the capacity to recover from the event. The methodology was further detailed by developing specific forms and guidelines for the seismic risk assessment of cultural heritage masonry constructions. *However, further refinements of the framework need to be developed in the near future to include more types of constructions as well as to define similar guidelines for other types of hazards.*
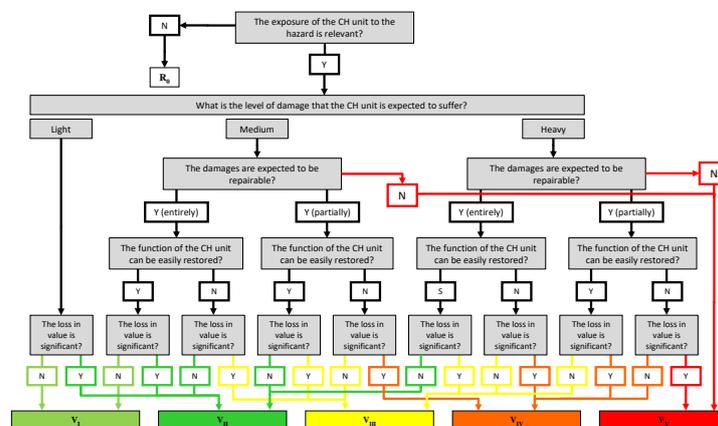
Figure 3. Risk assessment methodology for cultural heritage assets: vulnerability analysis
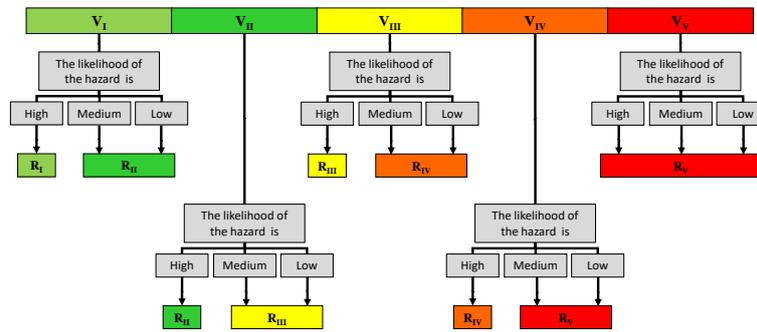
Figure 4. Risk assessment methodology for cultural heritage assets: risk analysis

Do we know enough about our cultural heritage?

Adequate documentation practices and inventories containing relevant data are essential for the sustainable management and preservation of cultural heritage assets, as well as to develop effective risk and disaster management strategies. Still, there are no standards or universally accepted documentation protocols and systems for cultural heritage assets. Even though some attempts to develop such standardized procedures have been made in the past (Kioussi et al, 2011, 2013; Myers et al, 2016), the responsibility for collecting and managing cultural heritage-related data ultimately depends on the administrative structure of each country or region.

Developing such inventories is known to be complex. Among others aspects, difficulties derive from the large variety of data that can or needs to be recorded for multiple purposes due to the multidisciplinary nature of cultural heritage preservation. Still, inventory systems have been evolving to reflect more holistic approaches of cultural heritage data recording. From initial systems that were more focussed on recording historical data, the evolution of heritage assets from an archaeological or architectural point of view, current heritage inventories evolved considerably, embracing digital technologies and including other data features. Other difficulties can also be related to data updating issues and the resources it involves. For inventories to be effective tools for the preservation of cultural heritage assets, the information they contain needs to be up-to-date to reflect the various changes in the state of that heritage over time. These and other concerns have been driving the evolution of the documentation and inventory practices for cultural heritage management. However, the level of evolution varies greatly from case to case and according to the type of data. For example, inventories with relevant technical

characteristics (e.g. adequate geometric surveys, data on the construction techniques or material properties) of built cultural heritage assets as well as information about the more recent interventions that have been undertaken on those assets are not so common.

In the context of having to manage intensive and extensive risks in cultural heritage, the existence of specific engineering-related data organized in a standardized format is an advantage since risk assessment and mitigation can then be performed in a more systematic and effective way. Data standardization becomes particularly relevant for managing heritage properties with similar construction processes and architectural characteristics. An example of such type of inventory system was recently developed (Nunes et al, 2017) for churches of the Portuguese Romanesque period and was used to collect data for 44 churches. For each church, the specific data collection form that was developed allows the recording of the geometric characteristics, structural typology, construction process(es), level of damage, changes and works carried out over time, the existence of heritage assets attached to the building, and its interaction with the surrounding environment. The collected data is a technical database that complements existing inventories and provides information for developing a comprehensive cultural heritage property management system. Potential losses can be estimated by correlating this information with a certain type of intensive or extensive hazard and the urgency of mitigating measures can be determined from the likelihood of the hazard occurrence. For the particular case of frequent or persistent hazards, the possibility of establishing the conservation state of the load-bearing structure of cultural heritage assets and identify the sources of existing damage and/or of ongoing degradation phenomena through systematic surveys provides fundamental data for risk mitigation. Moreover, having adequate knowledge about the materials, geometry and building processes of these cultural heritage assets also allows estimating risk mitigation costs and perform cost-benefit analyses to minimise heritage losses. By extending this type of analyses to a large group of heritage properties with similar architectural characteristics, common issues can be more easily identified. As such, the planning of risk mitigation actions is also facilitated.

Data on the presence and type of decorative cultural heritage assets that are attached to a given heritage construction (e.g. mural paintings, tiles) is another important component that needs to be included in engineering-related data inventories. This type of information is particularly important when estimating potential cultural heritage damage and losses because a certain hazard intensity that is not expected to cause

significant damage to the component supporting those assets may in fact cause a substantial loss in value to those assets. Moreover, when defining risk mitigation measures that involve the components supporting those assets, the type of mitigating action and/or solution needs to account for the presence of those assets. A similar line of reasoning needs to be applied when developing emergency measures for those components after a disaster. Surveying data on decorative cultural heritage elements attached to the constructions along with the more technical and engineering-related data, therefore provides a more complete and multidisciplinary view of the immovable heritage asset.

Another category of information that should also be included in cultural heritage inventories is related to the type of landscape and environment that surrounds a given heritage construction. Information on the existence of nearby water sources or forest sites, on the type of terrain (material and slope) or other relevant environmental data is essential for risk management procedures related to hazards such as landslides, fire, floods or heavy rains.

Given these issues, it can be seen that developing or extending cultural heritage inventory systems to include these types of data should be promoted. *Having this additional data allows for a more holistic approach of heritage management, providing support for a realistic analysis of potential losses and of the existing constraints for defining risk mitigation actions.*

Are we efficient when communicating cultural heritage risk?

Risk analysis is expected to provide information for informed decision-making, given the uncertainty one might be faced with and the potential consequences of the uncertain events under analysis. This information about risk can range from qualitative insights on the expected damage to quantitative expressions of performance and losses. Selecting an adequate risk metric to communicate risk is an essential part of the risk management process. An adequate risk metric reflects the result that must be conveyed from the risk analysis but also needs to be easily interpreted by decision-makers and stakeholders.

Given the large number of existing metrics and the fact that new metrics can be defined for a specific purpose, selecting the most adequate one is often challenging. Johansen and Rausand (2012) propose eleven criteria to evaluate the adequacy of a certain metric. Three of these criteria focus the quality of the risk output received by

stakeholders. Communicability refers to the ability of the risk information to be grasped by non-experts, Contextuality refers to the suitability of the risk metric for decision support and Acceptability analyses if the risk information is considered legitimate and informative by the relevant stakeholders. In order to optimize the impact of the risk information on the mindset of stakeholders, a possible strategy is to address first these three criteria when selecting an adequate risk metric to communicate cultural heritage risks. Still, what is the metric and what should it reflect regarding cultural heritage?

Cultural heritage is a fundamental resource for enhancing social capital and plays an important role in the *smart* (education, training, knowledge, new technologies), *sustainable* (regional attractiveness and competitiveness, greener economy, reuse of resources) and *inclusive growth* (creating jobs, social cohesion, quality of life) of societies. Global international strategies currently recognize that cultural heritage is an asset in economic growth and in addressing societal challenges. A recent project (CHCFE, 2015) examined the wide range impacts of cultural heritage and acknowledged that clear positive impacts can be found on economy, society, culture and the environment. Still, the project also concludes that further research is needed to measure these impacts and that a holistic approach should be followed to fully understand their wide reach. From the disaster impact and risk management points of view, the ideal risk metric(s) should be able to reproduce the holistic influence of cultural heritage. However, evidence of these impacts will occur distributed in time (some in the short term while others only in the long term). Therefore, selecting the most adequate time range creates an additional challenge for risk communication.

Given the intangible nature of cultural heritage value, a risk metric that would measure the direct impact of destroyed or lost cultural heritage is inherently non-quantitative. To determine a quantitative measure, the destruction or loss of cultural heritage needs to be defined based on its indirect effects. Furthermore, to maximise the impact of the risk information on stakeholders, an economic perspective of these effects is usually preferred. The topic of economic valuation of cultural heritage has been the subject of several studies over the past years and several methodologies were developed to elicit monetary expressions of cultural values. Aside from their complexity and the difficulties to scale their results, it is noted that most of these methods were not developed to estimate economic losses due to damaged or destroyed cultural heritage. Therefore, their usefulness to derive an efficient risk metric is limited, especially to represent the wide range scale (i.e.

regional or national level) of cultural heritage impacts. Alternatively, global economic indicators such as the gross value added associated to the cultural heritage sector (Romão and Paupério, 2016) are seen to have more potential to capture cultural heritage impacts both on a wider scale and in the short-to-long-term. *Nevertheless, there is a clear need for risk metrics defining an equivalent economic value that reflects (even if only partially) indirect losses due to destroyed and damaged cultural heritage, which would then help communicating these impacts to stakeholders and facilitate their engagement in cultural heritage protection.*

Are we prepared for disasters?

Numerous disasters in the past highlighted the fundamental role of preparedness in DRR and DRM. The readiness of special teams prepared to act in emergency situations is paramount to reduce the impact of disasters. However, unlike sectors that only require civil protection entities and emergency response officials to be ready to act in case of an emergency, other stakeholders need to be involved when dealing with cultural heritage. When addressing preparedness for cultural heritage, two components need to be analysed: movable heritage and immovable heritage.

For movable heritage, preparedness needs to cover two aspects: priority lists to evacuate movable heritage if necessary and training of emergency-response officials to ensure adequate handling, conservation and care during the evacuation. While there have been several initiatives across the world to address the latter (e.g. in England, Italy or Spain, the training initiatives developed by ICROM and the Smithsonian Institute), the former is still challenging. One of the challenges is often related to the reluctance or inability of heritage curators to define pre-disaster priority lists to evacuate movable heritage. If a disaster occurs and such lists are not available, decisions about rescue priorities to determine which items to save and which to sacrifice might have to be made fast, possibly in a chaotic environment which might lead to mistakes. Defining priority lists prior to the occurrence of a disaster allows for clear thinking and adequate planning to minimize the consequences.

The two aspects that were addressed for emergency actions in disaster scenarios involving movable heritage are well known. Yet, they are not given enough consideration and priority. *The training of emergency-response officials to ensure adequate behaviour during an evacuation should be part of their normal training. Furthermore, institutions responsible for managing movable heritage collections*

should enforce the development of adequate emergency plans accounting for the evacuation of those collections, including the necessary logistics and human resources that might be required.

Final Remarks

International frameworks and programs for DRR and DRM are clear in their objectives of reducing hazard exposure and vulnerability to disasters. Furthermore, the importance of cultural heritage and its irreplaceable value for society is also clearly acknowledged in these objectives. However, the implementation of effective actions for DRR and DRM in cultural heritage has been slow. Some practical aspects connected to this lack of tangible changes were addressed herein given they require further discussion, research and development. The topics that were addressed focus cultural heritage disaster loss data collection, risk assessment methods for cultural heritage, cultural heritage data inventories, efficient risk communication for cultural heritage and planning for emergency response. The importance of each topic was briefly reviewed and the current state of knowledge was discussed within the objectives of existing DRR and DRM international initiatives. Although some research and development needs are identified, the main objective of the paper was to draw some attention on a few fundamentals aspects of DRR/DRM for cultural heritage in order to foster further in-depth discussions on these topics.

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Underwater Mapping: A Technology Review

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Abstract

Geospatial content is frequently an important characteristic of tangible cultural heritages. Mapping would be an essential procedure for documenting both the site and the object. For those heritages underwater, the mapping imposes a different challenge. That is, the water. Sonar based instruments such as single beam and multi beam echo sounders and side scan sonar, have been the major tools used for underwater mapping. Optical instruments such as bathymetric lidar, and underwater photogrammetry have also been applied in various archaeological projects. This study outlines the mapping technologies, which could be applied to underwater mapping based on literary reviews. Among them, 3D multi-beam scanning sonar is a new type of instrument based on sonar technology. And, underwater photogrammetry is found to be a flexible and economic tool for documenting the details on a large scale. Due to the successful implementation of Structure-from-Motion, such photos provide not only wonderful texture, but also 3D geometry in a convenient manner.

Key Words: Sonar, Lidar, Photogrammetry

Introduction

Surveying and mapping provide the tangible cultural heritages such as buildings and other form of constructions that can be used as a fundamental description for both geometric and other attributes. This paper reviews the current technology for conducting surveying and mapping under water that are suitable for both the site and the object. Edsall et al. (1997) and Kvitek et al. (1999) documented rather complete outlines of the technologies featured in remote sensing. That is, "the acquisition of information about an object or phenomenon without making physical contact with the

object" (Wikipedia, 2017).   In general, there are two categories: the acoustic methods and the electro-optical methods. This study outlines updates in these technologies. Progress and various applications are summarized based on reviewing recently published literature.

The acoustic methods

The acoustic methods are mainly based on Sonar technology. Sonar (SOund Navigation And Ranging) is a technique that uses sound propagation (usually underwater, as in submarine navigation) to navigate, communicate with or to detect objects on or under the surface of the water, such as other vessels (Wikipedia, 2017a). There are two categories, passive and active, based on whether the sound source is provided by the instrument. The one used for mapping is the active sonar. Kvitek et al. (1999) grouped the instruments into the following categories: single-beam bathymetry, acoustic substrate classifiers, multi-beam bathymetry and side-scan sonar.

Some characteristics of the single-beam sonars, which are commercially available, are listed in Table 1.   In general, the higher the frequency, the better the range resolution, and the shorter the measured range.   But, there are also other instrumentation design factors.

Multi-beam sonar has more than one beam operating at the same time. This function provides fan-shaped coverage, and could measure a swath which has denser measurements across the moving direction. In consequence, more details could be revealed. A part of the sonar specifications are listed in Table 2.

Table 1: Single-Beam Sonars

Company	EchoLogger	EchoLogger	Kongsberg Maritime	Marine Sonic Technology
Model	High resolution Scanning Sonar, Echologger RS900	Mini imaging sonar	Clariscan	Sea Scan ARC Scout MKII Sid
Max. depth [m]	1500	1000	4000	10000
Min. frequency [Hz]	800K	800K	330K	300
Max. frequency [Hz]	1000K	1000K	1100K	1800
Typical range [m]	60	60	150	250

Minimal detectable range [m]	0.3	0.15	0.5	3
Min. pulse length [µs]	10	10	5	128
Max. pulse length [µs]	500	100	1000	256
Max. update rate [Hz]	10	10		60
Range resolution [m]	0.0075	0.075	0.00375	0.004

Table 2 Multi-beam sonars

Company	Blueprint Subsea	Blueprint Subsea	Blueprint Subsea	Coda Octopus	Coda Octopus	Coda Octopus	Imagenex	Kongsberg Maritime	Kongsberg Maritime
Model	Oculus M750d Dual Freq. Multibeam Sonar System	Oculus M370s Single Freq. Multibeam Sonar System	Oculus M1200d Dual Freq.	Echoscope® Real-Time 3D Sonar	Dimension® -90+	Echoscope® C500 Rea	881A & 881L	M3 Sonar - 500m	M3 Sonar - 4000 m
Max. depth [m]	300	300	300	3000	3000	3000	3000	500	4000
Min. frequency [Hz]	750K	375	1200K	340K	240K	375K	2800	450	450
Max. frequency [Hz]	1200K	375	2100K	750K	325K	610K	1100	550	550
Typical range [m]	120	200	30	120	50	120	200	150	150
Minimal detectable range [m]	0.1	0.2	0.1	1	1	1	0.15	0.2	0.2
Max. number of beams	512	256	512	16384	8192	8192	1200	256	256

Min. pulse length [μs]	0	0	0	6	6	6	10	20	20
Max. pulse length [μs]	0	0	0	333	333	333	1000	10,000	10,000
Max. update rate [Hz]	40	40	40	12	20	12		40	40
Range resolution [m]	0.004	0.008	0.0025	0.03	0.03	0.03	0.02	0.01	0.01

Company	NORBIT Subsea	Shark Marine Technologies	Sound Metrics	Sound Metrics	Teledyne Marine	Tritech	Tritech	Tritech
Model	FLS	NAVIGATOR Diver Held Imaging Sonar	DIDSON Diver Held	DIDSON 300m SV (Standard Version)	SeaBat 7128	Gemini Narrow Beam Imager (NBI)	Eclipse	Gemini 720i
Max. depth [m]	6000	100	300	300	400	4000	2500	300
Min. frequency [Hz]	360	450K	1100	1100	200	620	240	720
Max. frequency [Hz]	440	2250K	1800	1800	400	620	240	720
Typical range [m]	150	100	30	30	200	120	120	120
Minimal detectable range [m]	0.2	0.2	1	1		0.5	0.4	0.2
Max. number of	256	768	96	96	256	256	256	256

beams								
Min. pulse length [µs]	10		4.5	4.5	33	25		25
Max. pulse length [µs]	500		144	144	300	200		200
Max. update rate [Hz]	50		21	21	50	30		30
Range resolution [m]	0.01	0.003	0.0025	0.0025	0.035	0.01		0.008

Side-scan sonar is a very useful instrumentation for obtaining images of underwater terrain. Usually, the sonar is in the form of tow fish, towed by surface vehicles or submarines. Equipped with a linear array of transducers, side-scan sonar receives backscattered acoustic energy. In general, if all other parameters are constant, a rough surface will backscatter more energy than a smooth surface and therefore, return higher amplitude signals. The sound frequencies used in side-scan sonar usually range from 100 to 500 kHz; higher frequencies yield better resolution but less range (Wikipedia, 2017b). Taking Edgetech 4125 as an example, the operating ranges are 150m @ 400 kHz, 75m @ 900 kHz; 120m @ 600 kHz, 35m @ 1600 kHz, and the resolution across the tracks are 2.3 cm, 1.5 cm, 1.5 cm, and 0.6 cm, respectively.

Kvitek et al. (1999) described the "acoustic substrate classifier" with two models, Marine Micro System's 'RoxAnn', and Quester Tangent's 'QTC View'. RoxAnn examines two different waveforms and then derives the measure of hardness and roughness of the sea floor. QTC View works with echo shape analysis based on the principle that different sea beds result in unique wave forms. Principle Component Analysis is applied for identifying sea bed types.

Besides the four categories described above, the latest instrumentation would be 3D multi-beam scanning sonar. Tyledyne BlueView BV5000 is one of this type (http://www.teledynemarine.com/blueview-3d-multibeam-scanning-sonar). This type of instrument provides 3D point clouds, which could be used for modelling and identification, particularly for relatively smaller objects.

The Electro-Optical Methods

There are three categories, Compact Airborne Spectrographic Imager (CASI), Lidar, and Laser Line Scanner (LLS) in Kvitek et al. (1999). CASI is a hyperspectral sensor. Airborne Hydrographic Lidar (ABL) utilizes green lasers for penetrating the water to map the sea floor. While the depth could be retrieved from the laser waveform, the reflectance from the substrate on the sea floor also provides additional information. Commercial ABL instruments now include Leica Chiroptera, Hawkeye III, Tyledyne Optech Titan, CZMIL, and Riegl VQ-880-G. Shih et al. (2014) applied Hawkeye II for Dongsha shipwreck identification. Although ABL is fully operational, the technology and instrumentation are still progressing. Westfeld et al. (2017) reported a study on the correction for the wave pattern. The advantage of ABL as compared to shipborne instruments is that ABL is not influenced by the navigation risk of shallow waters. Therefore, when surface boats/ships are not suitable for operation, ABL provides a solution.

LLS systems also utilize green lasers, but are deployed either as a towed fish, or on submersibles. The potential resolution of LLS is much better than that provided by side-scan sonar, as fine as 1 mm (Kvitek et al., 1999). Commercially available systems of LLS include one manufactured by Northrop-Grumman (formerly Westinghouse) and another by Raytheon Corporation. LLS is included in Northrop-Grumman AQS-24B Mine-hunting System, together with a high resolution sonar (http://www.northropgrumman.com/Capabilities/ANAQS24/Pages/default.aspx). NOAA documented an experiment in 2001 with a Northrup-Grumman SM-2000 monochrome laser line scanner (http://oceanexplorer.noaa.gov/projects/laser01/laserlinescan.html). Wang and Tang (2012) utilized a seafloor laser scanner developed by the US Office of Naval Research and measured the shells on the seafloor. There are also families of underwater laser scanners manufactured by Newton (http://www.newtonlabs.com/subsea_scanners-1.htm), 2G Robotics (https://www.2grobotics.com/), OceanTools (http://www.oceantools.co.uk/laser/c-scan-3d-laser-imaging/), and others.

Reviewing recently published literatures, underwater photogrammetry has shown increasing popularity. This is largely related to the successful implementation of Structure-from-Motion algorithms. Drap (2012) provided extensive background review of underwater photogrammetry with a focus on archaeology. The refraction of dioptre water-glass and the presence of the housing, which are significant elements causing disturbance, could be modelled with radial distortion parameters in the photo

alignment. This made the photos taken underwater able to be processed with general photogrammetric software, a unique advantage.

As for research cases, Bryson et al. (2017) applied underwater photogrammetry for measuring marine habitat structural complexity. The study sites are an artificial reef scene (with known 3D structure) and shallow water coral reefs on the Great Barrier Reef, Australia. A diver-operated stereo camera rig was used to collect imagery. The performance of photogrammetry is analysed with the repeatability of coral reef structural complexity measurements derived from the reconstructed 3D model. Drap et al. (2015) studied the case of Xlendi wreck in Malta, which is resting at the depth of 110m. A three-camera system was used, with the base between cameras calibrated. A stereo base of 0.297 m was used to constrain the scale of the overall 3D model. In Drap et al. (2015), the object surveyed are at very fine scale, with a 3D model of each pottery able to be constructed.

Pizarro et al. (2017) also utilized a stereo camera system in the area of Lizard Island in the Great Barrier Reef, Australia. The path of "flight", that is the travel route of the diver, was explored. From the experiments, the spiral pattern which constrains the motion of a swimmer using a line unwinding from a fixed central drum shows much better control than the ordinary parallel flight pattern as used in aerial photogrammetry. The study object of Raoult et al. (2017) is also a coral reef, Heron Island, a coral cay on the southern end of the Great Barrier Reef, Australia. GoPro™ Hero 4 Black cameras were used. As concluded from the experiments, the mean measurement error across all bommies and between observers was 15 ± 2% for volume measurements and 12 ± 1% for surface area measurements. Robert et al. (2017) combined side-looking multi-beam echo-sounder (MBES) data from an AUV, forward-looking MBES data from ROVs and ROV-acquired videos. The study object is the walls from Rockall Bank and Whittard Canyon, Northeast Atlantic. An SfM algorithm is applied for the photogrammetric processing of video footage.

Yamafune et al. (2017) documented the work for recording and reconstructing the wooden structures of a 19th-century shipwreck in southern Brazil (Lagoa do Peixe site) and of a 16th-century shipwreck in Croatia (the Gnalić shipwreck). Notably, control points on the sea floor with coded targets were installed and used in the photogrammetric processing. For obtaining the coordinates of the control points, distance measurements were made with tape by divers and depth was measured with UWATEC Aladin Ultra, a depth gauge, and followed by a network adjustment. Young

et al. (2017) used SfM for photogrammetric processing, and the image was collected with a single GoPro camera. The study object is the coral reef.

Concluding Remarks

Each mapping technology has its suitable working scale. For the underwater environment, photogrammetry is constrained to high resolution, large scale applications. This limitation is due to the rapid reduction of image clarity with longer distances in the water. The 3D multi-beam scanning sonar is also suitable for high resolution and large scale. But, it is further confined to smaller sites due to the range and mobility limitations.

Future development would certainly be in multi-source integration. Sonar based systems and ABL are generally suitable for larger area operation, while underwater laser scan, photogrammetry, could provide better detail. In all cases, the cost and economic value of each tool chosen would be important considerations, as well as the availability of collection of photos.

Acknowledgements

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TRYING NOT TO BE A UNESCO WORLD HERITAGE SITE? REASSESSING THE RE-HERITAGIZATION STRUGGLES OF MONASTERIES
IN CONTEMPORARY XI'AN

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Abstract

This article delves into the relationship between religious cultural heritage and corresponding monastic communities in Xi'an since the 1980s. Two of the representative monasteries discussed in this article were designated as cultural heritage first in the 1950s and then reinstated as religious sites in the 1980-90s under Chinese new religious policy and with foreign aid. With mentalities shifted to take religious revival as a means to advance political and economic goals, Xi'an Municipal government has endeavored to remake the religious heritage since 2002, such as creating religious cultural scenic areas surrounding the monasteries or seeking for World Cultural Heritage endorsement. Controversies gradually accumulated and eventually sparked bottom-up defense initiated by the monasteries and altered official re-heritagization plans. What discursive strategy, spatial strategy, and physical strategy has various stakeholders adopted to attain their ends?

Based on on-site investigation and interviews, this article illustrates the interaction among various stakeholders, addresses social dynamics within such groups, and analyzes specific events and how they transformed such diverse and plural relationships. From the reviving experiences of these monasteries, the author argues that planning should be utilized as a spatial tool for contextualizing the present historically rather than for power struggle.

Key Words: Re-Heritagization, Religious Cultural Heritage, Monastic Community, Spatial Politics, World Heritage

Introduction

Nowadays the community is playing an increasingly important part in cultural heritage conservation (Rössler, 2012). One of the best examples that involve community with cultural heritage in China is the revival of monasteries on the heritage sites.

As a celebrated cosmopolitan metropolis in ancient China, Xi'an (formerly Chang'an) was once full of Buddhist monasteries during the Tang Dynasty (618-907). Six of the eight founders of Japanese Buddhism sects originated from Chang'an. Besides religious importance, those monasteries were also designated as cultural heritage for their historic and artistic interest. All the monasteries discussed in this article were designated as cultural heritage first in the 1950s and then reinstated as religious sites in the 1980-90s. Therefore, contrary to commonly seen heritagization of religious sites and practice, Chinese contentions were more about re-sacralization of cultural heritage.

Popular religion in China had once been stopped because of the Cultural Revolution (文革) during 1966-1976 and resumed in the 1980s under new religious policy. With mentalities shifted to take religious revival as a means to advance political and economic goals (Cook, 2017), Xi'an Municipal government has endeavored to remake the religious heritage since 2002, such as creating religious cultural scenic areas surrounding the monasteries or seeking for World Cultural Heritage endorsement. This is what the author called "re-heritagization" or the process of remaking heritage in this article.

Responding to the Conference's theme of "Heritage and Democracy/ Public Participation and Engagement" in cultural heritage conservation, this article delves into the relationship between religious cultural heritage and the community in Xi'an. One matter of concern is the innate contradiction and tension among religious missions, heritage conservation, and commercial development.

The process of heritagization and de-sacralization in the 1950-60s, re-sacralization in the 1980-90s, and re-heritagization in the 21st century was contentious. Controversies gradually accumulated and eventually sparked bottom-up defense initiated to ensure public access to monastic cultural heritage. The Famensi Incident (法門寺事件; "si" literally means the monastery) in 2009 and the Xingjiaosi Incident (興教寺事件) in

2013 are two of such examples in Xi'an. Because of the extensive presence of Buddhism in neighboring Asian countries, such kinds of disputes always catch worldwide attention.

The Incident of Xingjiaosi on April 11, 2013

In June 2014, Xingjiaosi Dagobas (興教寺塔) in China was declared a World Heritage Site by UNESCO under the title of "Silk Roads: the Routes Network of Chang'an-Tianshan Corridor" submitted jointly by China, Kyrgyzstan and Kazakhstan. One year before enlisting at the outset of nomination and preparation phase, however, great unrest and discursive controversy had been stirred up against applying for such status. Was the official ambition to pursue higher heritage recognition a negative thing in China?

The focus of contention was Xingjiaosi, the founding monastery of dharma character school (唯識宗). Xingjiaosi is celebrated for holding the bone-relics tombs, namely the dagobas (舍利塔) of Master Xuanzang (玄奘, 600-664, whose story was the prototype of the novel "The Journey to The West") and two of his disciples. All three of them were eminent Buddhist monks in the 7th century. Judging mainly from architectural and historical values, in the officials' and the experts' minds, only the dagobas were the target for conservation. For better preserving the three dagobas and applying for UNESCO World Heritage site status, the local government planned to demolish some new additions that were too large and too close to the dagobas (see Figure 1). Although those buildings scheduled to be demolished were illegal ones that were rebuilt no earlier than the 1990s, the dormitories and the dining hall, to name a few, were constructed for the monks' daily use by the pilgrims' donations. The official decision encountered with the monks' resistance out of panic.

The monastic community expressed their concerns and even proclaimed to be out of the heritage declaration activity. The monastery's resistance to be "re-heritagized" soon received hundreds of thousands of supporters both from the internet and the physical world, nationalwide and transnationalwide.

One of them is the famous actor "Liou-xiao-ling-tong (六小齡童, 1959-)" who was noted for playing the role of Monkey King (孫悟空 or Sun Wukong, mythlogically a disciple of Master Xuanzang in the 16th century fiction) in "The Journey to The West (西遊記, a movie based on the fiction)" in 1984. His appeal has been forwarded more

than one hundred thousand times within a day. A net citizen yelled in jest that "Wukong, come and rescue your master!"
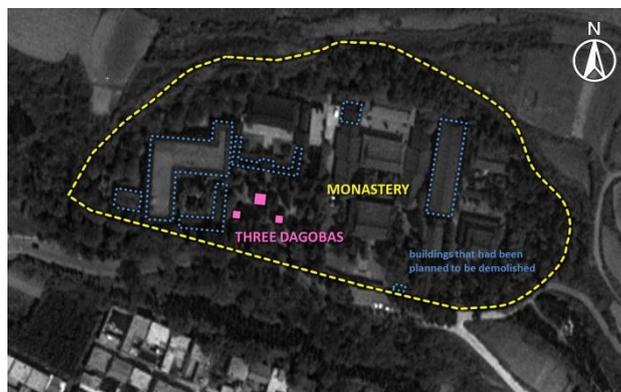
*Figure 1. Map of Xingjiaosi that shows
the official demolition plan (Source: background retrieved from the Google Map,
marked by the author.)*

Supported by the religious circles and the lay public, the monks' defense has finally created space for negotiation and reshaped the local government's demolition and possibly tourism-oriented renovation plans. Instead of demolition, big trees were transplanted around the dagobas for blocking the view of the adjacent high modern buildings. It was an alternative measure that expediently taken for passing the inspection of ICOMOS technical evaluation missions. Without massive demolition and extravagant restoration, the universal values of these dagobas were still recognized by UNESCO. This outcome just proved a simple conversation principle that every Chinese local government knows but never follows.

The Purpose and Significance of this Research

What took place in Xingjiaosi sounds an impossible achievement, especially judging from the status quo in China. In our past experiences, ordinary people could seldom be proactive actors but vulnerable ones when facing government's planned demolition and relocation actions under the banner of "heritage conservation" and "public good". However, we saw the rights defense actions performed in Xingjiaosi made an unprecedented achievement that eventually altered official re-heritagization plans. In this regard, the disputes over Xingjiaosi probably indicated the transforming mutual relationship between heritage and community in question. How did the monastery and

the public take part in or against the process of becoming world heritage in contemporary China? How had heritage decisions been made? Will historic monasteries be a privileged type of cultural heritage considering the monastic capacity of constructing social identity, coalescing consensus, and mobilizing the crowds? To what degree can these collective actions be tolerated by the state? How to "preserve" a sacred site while an accompanying religious culture is still vibrant?

What happened to Xingjiaosi certainly should not be treated independently from its forerunners, such as Famensi, which experienced similar controversy. This preliminary research thus aims to delve into the long-term relationship between religious cultural heritage and corresponding monastic communities in Xi'an since the 1980s.
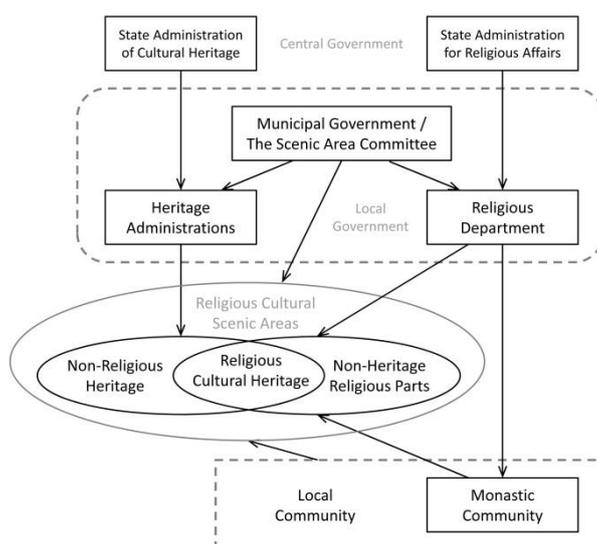
Figure 2. Relationship among the Stakeholders
(Source: the author)

Based on on-site investigation and interviews, this article illustrates the interaction among various stakeholders (see Figure 2), addresses social dynamics within such groups, and analyzes specific events and how they transformed such diverse and plural relationships. That is to say, how had the monastic community been influenced by the local government's re-heritagization efforts? What was their bottom-up reaction? What discursive strategy and spatial strategy has various stakeholders adopted to attain their ends? What kind of power relations was revealed in particular spatial and temporal contexts? How did these experiences transform the community's

attitudes toward religious cultural heritage?

The Case of Famensi: A Spatial Reading

The Monastery and the Museum in the 1980-90s

Famensi is famous for holding the sacred bone relics (骨舍利) of Shakyamuni Buddha (釋迦摩尼佛). The monastery building, especially the dagoba (真身寶塔), was constructed for protecting and glorifying the sacred bone relics enshrined underground. People's memory about the historic Famensi had once faded until the underground shrine was unearthed in 1987. After the discovery of the sacred relics and accompanying treasures, a specialized museum complex (法門寺珍寶博物館) was established. The discovered objects were categorized as "cultural heritage" rather than "religious instrument" anymore. At first, the separation of monastery from their sacred object did not cause any disagreement.

Figure 3. Map of Famensi that shows the spatial relations of the monastery and the museum (Source: background retrieved from the Google Map, marked by the author.)

From the perspective of spatial configuration, we can see the power relations among the stakeholders of Famensi. In 1988, the museum complex was added to the monastery in a modest way (see Figure 3) according to the architect's design concept (Zhang, 1992). The museum complex was arranged aside with a shorter axis than the monastery. The main building of the museum complex was designed in pavilion-style

(閣) which showed its subordinate position to the sanctuary-style (殿) temples in the monastery (see Figure 4). A quadrangle was placed forward to the museum complex in order to make its gate facing east toward to the monastery, which signified an inferior status compared to the south-facing orientation in the norms of traditional Chinese architecture. The higher gate (山門) of the monastery and the lower one of the museum complex then enclosed and shared the same piazza.

At this time, the monastery and the museum staff each performed its specialized duty and worked together in harmony. This kind of spatial hierarchy thus could be seen as a representation of their relationship.

Figure 4. Various Chinese traditional styles were deliberated selected to signify the superiority of the historic monastery (Source: the author)

Famensi Buddhism Cultural Scenic Area in 2003-2009

Twenty years after the addition of the museum, on the contrary, the scenic area committee (a government-enterprise alliance) took a totally different stance in planning the brand new Buddhism Cultural Scenic Area. The launch of the scenic area building project has thus changed the power balance between the monastery and the museum fundamentally.

Famensi Buddhism Cultural Scenic Area (法門寺佛文化景區) is characterized by a 108 meter wide, 1230 meter long boulevard which terminated with a dagoba called *Heshi Shelita* (合十舍利塔, literally "palm-folding dagoba"). The new 148 meter

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dagoba is a lot higher than the historic 50 meter dagoba in the monastery. An immense area with more tourism spots, luxurious hotel and other facilities were constructed to attract people to spend more time and money. The parking lots in the scenic area even occupy a land more than three times as large as the monastery and the museum complexes combined. The establishment of larger territory, a longer axis, and a taller dagoba seemed to be a reversal of hierarchy that implied the committee's ambition to take over leadership from the monastery (see Figure 5).

Under the new one-ticket policy, visitors only need to pay through all three places including the monastery, museum, and scenic area once and for all, just at a much higher price. The Qujiang Committee was the one who collected all of the ticket revenue and redistributed the profits to the other two parties (or not).

Four kinds of spatial tactics utilized by the scenic area committee are identified, namely "overriding historic centrality", "detoured accessibility", "camouflage," and "enclosure".

(1) Overriding historic centrality: By establishing a new axis, the scenic area overrode historic centrality and made itself in a superior status than the monastery. Most importantly, the scenic area committee has determined to enshrine the sacred bone relics in the new and higher Heshi Shelita instead of the historic one. The sacred focus was thus shifted.

(2) Detoured accessibility: By the design of tourist itinerary, the monastery and the museum were degraded as a subsidiary branch of the scenic area. If a first-time visitor follows the official tourist map, the monastery and the museum would be the last, if not missed, destination in the corner.

Figure 5. Map of Famensi that shows the spatial relations of the monastery and the scenic area (Source: background retrieved from the Google Map, marked by the author.)

(3) Camouflage: The scenic area chose expedient roles to play according to specific circumstances. To profit from religious donations, Famensi scenic area pretended to be the sacred core with the setting of incense burners and donation boxes. When launching stocks to draw in investment seemed to be a possible move, it was declared that the Buddhism scenic area was not meant to serve religion.

(4) Enclosure: Not only adhering to the historic monastery for popularity and legitimacy, the scenic area was extensive enough to enclose the monastic territories. By setting up the scenic area and instituting new one-ticket policy, the local government aimed to incorporate, if not replace, the monastery and the museum into their territory. It was the direct cause of the monks' legal protest.

The Incident of Famensi on March 20, 2009

Accumulated antagonistic sentiments had finally burst into fierce protests fifty days before the inauguration of the scenic area. The committee's action of building walls in front of the monastery in an attempt to encircle the monastery had triggered the monks' resentment. Running out of their patience, the monks together with several hundred pilgrims, local residents, and tourists pushed over the walls (see Figure 6). The photos were made public on the internet immediately. The monks shut down the gate of the monastery soon afterwards and announced their legal protest on the website. The news was quickly widely broadcast and discussed.

Figure 6. The monks, pilgrims, local residents, and tourists pushed over the walls built in front of the monastery. (Source: http://tw.aboluowang.com/2009/0320/123195.html, retrieved Nov. 5, 2017.)

Without proper consultation and participation, the monastery has refused to cooperate all the way. The monastery's resistance signified the impossibility of funding the construction project by religious donations. Considerable amount of expenses on the construction, maintenance, and operation has become so burdensome that the committee could barely afford if not relying on the donations.

After the protest, the monastery and the committee made mutual concessions to the

besieging scheme. The enclosing walls were retained with a doorway opened. A small alley on the side was also left for monastic private use. Surrounded by the same walls, the historic monastery and the scenic area are connected and each of them has entrances.

The committee adopted another measures for attracting tourists that anyone enters from the scenic area receives a discount of 30-40%. Although it takes a long walk entering from the gate in the scenic area, travel agencies are motivated to arrange group visitors to do this way. For the first-time visitors, it is much easier to find the scenic area because of the 148 meter high landmark and straightforward driveway especially compared to the detoured route leading to the monastery.

Even though the independent passageway is kept, the monastery is still physically edged out by the planning of the scenic area. Being unconscious of the differences between the two, the pilgrims often have finished their donations before they arrived at the final destination, the monastery. Compared to the past, six-sevenths of the revenue has been lost since the inauguration of the scenic area. Certainly, the committee received not only money but also condemnation for making profits out of religion. Those negative experiences greatly impacted on how the monastery and the public look at the local government's plans on building religious scenic areas thereafter, such as Xingjiaosi.

Discussions

From the reviving experiences of these monasteries, the author tries to discuss the following issues. With foreign aid and public support, the monastic community could be empowered to reshape official conservation plans, although the potentiality of grassroots mobilization was still limited. Furthermore, even if there seemed to be advancement in social mobilization and public debates, what the people truly cared were more about legitimacy of official heritage discourse rather than conservation issues per se. What the monks protested against was not conservation but profit sharing in the name of conservation and social exclusion as a consequence of official conservation plans. The issues of uneven development and social injustice are usually concealed by an industrialized cultural discourse and a capitalized developmental manner in the building of cultural scenic areas in contemporary Xi'an. By associating with religion, the local government-enterprise alliance anticipated to benefit from the monastery's capacity of fundraising, besides creating cultural spectacle and media

hype.

The ideal of integrated conservation takes the physical environment and the community together into consideration. Contextualized heritage conservation was not about literal continuation or simple duplication of physical forms but incorporation into the community's sustained interaction with the heritage. Not only the present space should be woven together into historic context, but the community should be included in the decision making process. Conservation planning should be a spatial tool for contextualizing the present historically and also a social instrument for empowering the community. It needs adequate wisdom in negotiating territory, hierarchy, and circulation.

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THE MEIHE VILLA IN TAIWAN: A HERITAGE BUILDING WITH *FENGSHUI* SIGNIFICANCE

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Abstract

Fengshui is a crucial aspect of cosmological awareness of the traditional Chinese and its manipulation often facilitates the formation of the built environment. When the intangible world heritage convention was validated in 2003, the designation of *fengshui* was enthusiastically promoted. It is also tangible, as its physical manifestation can be observed, as reflected by the appearance of the heritage traditional houses of the Han People in Taiwan. Without direct evidence, however, the *fengshui* significance is not easy to identify. In this regard, the Meihe Villa (built 1871 CE) in Daxi of Taiwan is really unusual as for its establishment a *fengshui* prescription of about 4000 words in length has been written down and left by the founding *fengshui* master. Named *Jifu yanqing* (Accumulative Blessing and Enduring Celebration, 1871 CE), the prescription clearly guided the physical formulation of the Meihe Villa. This prescription seemed unintelligible to the descendants and the physical features of *fengshui* were partially undermined or destroyed. This paper tries to decipher this prescription with the knowledge of related *fengshui* schools, field survey, and the old maps available from the GIS of the *Academia Sinica*. Without concerns for *fengshui* the conservation of heritage building in Taiwan will miss the key determinants underlying the formation of a Han traditional house compound.

Key Words: Meihe Villa, Fengshui, Heritage Building

The main points of Jifu yanqing

General Instructions

The *Jifu yanqing* (集福延慶) was prepared in 1871 CE for the *fengshui* plan of the Meihe Villa by a *fengshui* master Shengliang (生亮) together with his two sons Chaoda (超達) and Yuanda (源達) from Dapu (大埔) of Canton, China. This means that the underling *fengshui* teaching of the document is of Hakka origins and Master Yang Yunsong (楊筠松) of the Tang Dynasty (618-907 CE) was respected as the master. In fact, the teaching is a mixture of many *fengshui* schools, and a great part of it was out of later development.

The *Jifu yanqing* contains a series of narration of *fengshui* plan and advices to the householder. The contents reveal the main themes of *fengshui* applied and, more or less, the hierarchy they were arranged and considered.
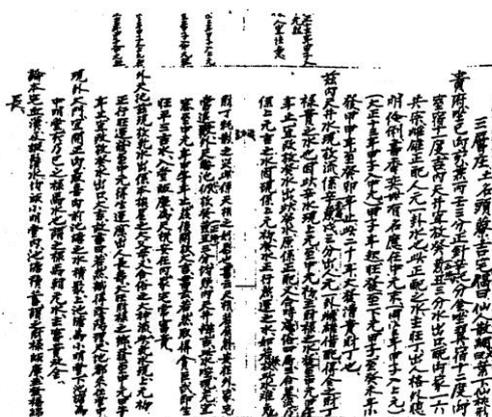
Figure 1. The first page of the Jifu yanqing. (黃士娟 2006)

Hexing (喝形)

Hexing is a very common *fengshui* practice which the *fengshui* master used to visualize and animate the whole picture of the configuration with some familiar, organic, precious or sacred figure or object. This would help him furthermore to fix the very spot (or small zone) of vital energy, so called *xue* (穴, literally a lair), to allocate the building or the tomb. It is also one manner to reflect the superiority of the *fengshui* master. The general *fengshui* configuration of the case was identified as *xianren sawang* (仙人撒網, an immortal casting fishing net) and *yexia xiantao* (葉下仙桃, an immortal peach with leaf on top). Both should mean a formation with a limited yet open head, then narrowly grasped but connected to a wide and circular open area.

The cyclical year and the orientation

The human establishment should be settled in the right place and at the right time. The good timing should be considered along with the orientation at the very beginning according to the principles of the Five Elements. Here the year cycle teaching was applied, which deals with three cycles (三元) of 60 years, called the Upper, the Middle and the Lower Cycles. The total 180 years are also subdivided by 9 into 9 lucks (九運), each lasting for 20 years. The decision for orientation should accord with the year. In this case, the construction year Xinwei (辛未 Fire, 1871 CE) is in the First Luck (Water) of the Upper Cycle and the orientation is from Si (巳 Fire, SES, seat) to Hai (亥 Water, NWN, facing) with inclination (to the three tenth of the sector near) Bing (丙 Fire, SE) and Ren (壬 Water, NW), falling on the Xinhai *fenjin* (辛亥 Metal 分金, subdivision) of the Correct Needle (zhengzhen 正針) of the compass. The allocation of drainage of the inner courtyard is also important, which should be directed to Gui (癸 Water, NE) with inclination to Chou (丑 Earth, NEN). Besides, the natal year of the founder Yihai (乙亥 Fire, 1815 CE) was also a decisive factor. For example, the Elemental attribute of the construction year, the seat direction and the natal year of the householder are all Fire. According to the principles of the Five Elements, Fire would be in harmony with itself; so those three would be in harmony with one another. Fire would generate Earth, Earth would generate Metal and Metal would generate Water; so, the *fenjin* would benefit the cyclical luck of construction year and the facing.

The drainage of the inner and the outer courtyards

The drainage of inner courtyard is now directed to Xin (辛 Metal, WN) with inclination to Xu (戌 Earth, NWW), which would gain wealth, male offspring, and nobility, and would flourish from the Upper Cycle, i.e. the time of construction, to the early Middle Cycle, until the Jiawu (甲午 Metal) year of the Middle Cycle. After then, it would be directed to Gui (癸 Water). Gui and Chou (癸丑) are at the stage of Burial (墓) of the harmonic triplet (三合) of Metal (Si, You, Chou, 巳酉丑), which is applied to the Upper Cycle. The drainage so directed at this period would attract threatening luck and would exhaust the wealth and male members of the household.

The drainage of the outer courtyard would be directed to Gui (癸 Water, NE) with inclination to Chou (丑 Earth, NWN), like the inner courtyard, but its outlet hole should be blocked at this Upper Cycle time until the Jiawu (甲午 Metal) year of the

Middle Cycle. Then, the blockage should be removed to allow proper drainage. For the time being, the drainage is directed to Qian (乾 Metal, NW), which is the one of the Big Spirits (大神) of the Three Spirits for Drainage (三神放水) and would enjoy a flourishing luck (旺運) at this early Upper Cycle time and a vital luck (生運), implying longevity for new born house members. Here, as we can see, the Elemental attribute of the early Upper Cycle is Water (one white Water), and the drainage is directed to Metal attribute position Qian (乾); the luck starting with the year Jiawu has the Elemental attribute of Metal (six white Metal), and the drainage is redirected to Water attribute position Gui (癸 Water, NE). This arrangement obviously follows the principle that Metal and Water are in the relationship of mutual generation.

The main gate and the Mingtang (明堂)

At the early period, the main gate prefers exact front facing. In front, it prefers ponds of full water. The upper pond is the small Mingtang (a bright and flat area) and the lower pond is the medium Mingtang. The water in the direction Hai (亥, also the exact facing of the Villa) is the water of *luma* (祿馬, luck and horse) of Si (巳, the seat position of the Villa), called the water of luck and horse facing the root direction (祿馬朝元水).

The outer water (外水)

The *xiehan* (血漢 blood stream) and the *xiaxu* (蝦鬚 shrimp tentacles) waters of the Villa are collected and directed to the inner Mingtang, called the wealth and luck returning to the store (財祿歸庫).

Mountains and ponds in front

The pointed mountain in front is called a brush pen, and the pond is called an ink stone pond (硯池). The brush pen with subordinates is a noble one and the ink stone pond is beautiful if its water is transparently clean, which would attract (reflect) surrounding mountain peaks, like Kuangheng (匡衡) of the Han Dynasty who punched the wall to steal light from neighbours. This indicates intelligent offspring and scholar generations. For this, the pond should avoid dirty water, otherwise the house members would often suffer from illness.

The inner sleeping arch table hill (內案眠弓) in front

In front of the Villa, the water embraced by the rice field and the inner sleeping arch table hill would imply scholar offspring and enduring noble leisure in a zither hall (琴堂不息). Master Yang has a saying that tens and thousands table hills would not

overtake a sleeping arch table hill, which is the noblest.

The inner attached water of the mountain dragon (內隨龍水)

The inner attached water of the mountain dragon prefers the one from the right hand side, and is collected back to the house compound as its *xiehan*. The other one on the left hand side, coming from the position of Geng (庚 Metal, WS) and You (酉 Metal, W), appears at the position Xin (辛 Metal, WN). It converges at the outer courtyard and goes to the downslope pond, which is called the outer salary going back to the store (外祿歸庫). Master Yang has it, water accumulated at a pond or a lake without flowing away, implies richness, nobility and multiple male offspring. He also has it, water coming from Xin to Qian (乾 Metal, NW) and passing through the outer courtyard, is called Xin entering Qian, and in so doing, rice fields and gardens will be counted hundreds and ten thousands. Also, Dui (兌 Metal, the same position as You) and Qian bear the same Elemental attributes, like that man and wife are in musical harmony. This writing accords with the vital (生) and flourishing (旺) lucks of the early Upper Cycle until the early Middle Cycle, implying the water of flourishing wealth and clothing. The good lucks will terminate in the year of Jiawu of the Middle Cycle, then, this water should not be visible. The period from the Upper Cycle to the early Middle Cycle will be even more flourishing for people born in the year of Si, You, Chou (巳酉丑, the harmonic triplet of Metal) and Hai, Mao, Wei (亥卯未, the harmonic triplet of Wood), as Metal would generate Water and Water would generate Wood.

The water outside the main gate

The current water outside the main gate is the most favourite one for the time being, i.e. from the Upper Cycle to the early Middle Cycle. But, for the next period from the year Jiawu of the Middle Cycle to the last year, Guihai (癸亥 Water), of the Lower Cycle the water of Qian (乾) and Dui (兌) must be prevented from sight, as this water will become dead (死) and threatening (煞). In this case, the sight facing to the rice field from the main gate might be screened by a wall or a row of bamboo, high enough to block the view of the water of the field or the pond. However, if the main gate opens to the position of Kan (坎水, N), the wall or bamboo will be unnecessary.

The relocation of the outer main gate

The outer main gate may be relocated to the position of Zi (子 Water, N) with inclination to Gui (癸 Water, NE), to the subdivision of Gengzi (庚子 Earth) / Gengwu (庚午 Earth); or to Gui with inclination to Chou (丑 Earth, NEN), to the

subdivision of Gengzi (庚子) / Gengwu (庚午).

Avalokitesvara bamboo

The bamboo outside the main gate should not be too high for fear of hiding the view of the vital (生) and flourishing (旺) waters. For the time of the Upper and Middle Cycles, the waters denote wealth and income.

The Dragon and Tiger doors beside the front yard of the main gate

The entry to the bamboo enclosure in front of the main gate is from two sides, called the Dragon and the Tiger doors. The door on the left is seated against the position Yin (寅 Wood, NEE) and faces the position Shen (申 Metal, SWW) with inclination to Jia (甲 Wood, ENE) and Geng (庚 Metal, WS), to the subdivision of Renyin (壬寅 Metal) and Renshen (壬申 Metal). The door should face the twin peaks, implying fame for the brothers of the house and both would have a male child. This will be valid in the years of shen, zi, chen (申子辰, the harmonic triplet of Water) from the year of Jiashen (甲申 Water) of the Upper Cycle (the second Earth luck). The bamboo should not hide the vision to the mountain peak. The door on the right should be seated against Shen (申 Metal) and face Yin (寅 Wood), with inclination to Geng and Shen (庚申), to the subdivision of Gengshen (庚申 Wood) and Gengyin (庚寅 Wood). It should be seated exact against the twin peaks at back, opening the treasury store (開寶庫), which would be effective from the late Middle Cycle, temporarily flourishing since the year Jiawu (甲午 Metal) of the Middle Cycle (lasting from the middle of the fifth Earth luck, the sixth Metal luck, to the seventh Metal luck) and would be greatly flourishing after the year Jiashen (甲申 Water) of the Lower Cycle (lasting from the eighth Earth luck to the ninth Fire luck). It indicates that the brothers of the house would pass the examination for officialdom at the same time and the treasury store will be responded with big wealth, comparable to the ancient rich man Tao Yi (陶猗). Seeing water through this right door in the Upper Cycle period and mountain peak through it in the Lower Cycle would be auspicious, effective to people born in the years of Yin, Wu and Xu (寅午戌, the harmonic triplet of the Fire Element). The Heavenly Barn (天倉) is in the position of Geng (庚 Metal, WS), implying a wealth with a thousand barns, effective from the year Jiazi (甲子 Metal) of the Lower Cycle. In the positions of Jia (甲 Wood, EN), Mao (卯 Wood, E), Yi (乙 Wood, ES) of the right hand side, there are flesh air and noble peaks, implying great prosperity after the year Jiachen (甲辰 Fire, the start of the third Wood luck), effective in the years of Hai, Mao, and Wei (亥卯未, the harmonic triplet of Wood) and to the people born in

the years of Hai, Mao, and Wei. (However, these two doors might be openings temporarily constructed on the bamboo fence or might not be realized at all as the onsite study did not find residues of this establishment.)

The inner attached water of the mountain dragon(內隨龍水)

The inner attached water of the mountain dragon, the water *xiehan*, and those on the right and the left, and from the four aspects, are all directed out to the hole at Gui (癸 Water, NE) position. The lower hills locked closely will not let the water disperse, thus the inner energy (Qi 氣) will be consolidated. This will generate distinctively noble and rich house members for long. This overall water outlet at Gui accords with the principle that 1and 6 are from the same origin (一六共宗), the male and the female match rightly (雌雄正配), and both belong to the Prime Dragon of Man (人元一卦). This water way implies distinctness and nobility and flourishes with wealth and offspring, most effective since the year Jiachen (甲辰 Fire) of late Lower Cycle, and fair effective from late Middle Cycle to early Lower Cycle. For the time being in the Upper Cycle, this is in shortage of auspiciousness.

The Azure Dragon hill at the inner table (內案)

The Azure Dragon hill at the inner table coils like a sleeping arch (眠弓) and embraces the lower hill. Master Yang has it, thousands and ten thousands tables are inferior to a sleeping arch table. This mainly indicates enduring noble leisure in a zither hall.

The White Tiger hill at the inner table

The White Tiger on the right side, the Mt. Grass Ridge (草嶺山), acts as the lower hill that coils and collects the water. Master Yang has it, never see if mountain dragon behind will come, but to examine if the lower hill (water outlet hill) turns back. Also, never see if the basis of the house is stable, but to examine if the lower hills intertwine and lock one another tight enough. For human dwellings and for graves, water outlet hills should always intertwine tightly. The book has it, if the configuration is complete and close, the inner energy (Qi) will extremely flourish. Thus, as Master Yang has it, thousand or ten thousand hills will not overtake a lower hill, which indicates not only wealth but also enduring blessing.

The Seal Stars (印星) over the water outlet

Inside the table hill, in the pond, the earth Seal Star is in the water, and the stone Seal Star is in the water outlet pit (水口坑). These two Seal Stars on water will be echoed

with gentry for generations. As Master Tao has it, this secures the top of examination list of officialdom for generations.

The Beast Stars over the water outlet

The Mt. Grass Ridge looks like a lion from outer side, and an elephant from inner side. An earth carp is in the water outlet pit (水口坑). As books have it, if there are Beast Stars (hills) over the water outlet, the inside area of the configuration should have a village of great noble men. Also, the Beast Stars over the water outlet would imply that some villagers will be high ranking officials. This will be effective during the Lower Cycle.

The outer hills

For the outer hills, the upper outer hill is Mt. Sandun (三墩山) on the left, and the lower outer hill is Mt.Nankan (南崁山) on the right, both collecting the water of rivers and the sea. This implies that there will be happiness of blessing during all three Cycles.

The outer table hill

The outer table hill is an overhanging civilian star in the calligraphy of the Chinese word one (一字文星). This implies enduring noble leisure in a zither hall. The sea embraces the outer table hill unseen (暗拱), echoed with a village flourishing with wealth and income for long.

The outer attached water of the mountain dragon (外隨龍水)

The outer attached water of the mountain dragon comes from Mt.Shimen (石門, literally stone gate), which is derived from the Black Warrior of tens miles behind. The water embraces the Mingtang unseen outside the table hills and goes northwards. This means completely collecting the water from its source and would enlarge prosperity.

Luck, horse and benefactor (祿馬貴人)

Along the twin brains (雙腦) of the drop range (落脈) behind the house compound, the back of the neck (項) is in the position of Bing (丙 Fire, SE). The luck of Bing goes to Si (巳 Fire, SES) and the luck of Hai (亥 Fire, NWN) also goes to Si. If there is a peak in the position of Hai, it is called the Original Horse Peak (馬元峰) of Si (巳 the seat position of the house), and the water in the position of Hai (the facing

position of the house) is called the water of the luck and horse facing the root direction (祿馬朝元水).

The coming range passing through the gorge (過峽)

The coming range is derived from a junior ancestor mountain (少祖山), and its previous section is not clear. The near mountain dragon movement is a horizontal one which, coming from the east, actively falls down and pauses section by section. The range drops at the directional position of Elemental attributes of Wood and Fire with the attribute of Tanlang (貪狼) star, branching widely along the moving mountain dragon like the Chinese word eight (八字) section by section, and protects the moving mountain dragon. It passes through the gorge at Huotan Keng (火炭坑, literally charcoal pit) like the knee of a crane or the waist of a bee (鶴膝蜂腰). Then, it rises up again and opens three brains in a row with stretching screens. The third brain drops likewise. The coming mountain dragon travels through the position of Si (巳 Fire, SES) and passes through two tops, where the fetal prime (胎元) is located. Then it bifurcates widely like the feather of cicada (蟬翼) and escorts the open area, where latently sit the planar position of Fire attribute. Then it drops and falls on the level hillock and, escorted by the feather of cicada on both sides, penetrates the rice field and passes through small gorges at the position of Bing (丙 Fire) inclined to Wu (午 Fire), where is the breath umbilical (息臍). Then, it distributes and lays onto a planar where it opens a big star face (星面). On the star face, a tiny blister appears at the centre and an embryo (化胎 pregnant embryo) is shaped, where the key position of the dwelling is pinned down. So, the embryo is crucial to human dwelling because, without pregnancy, there will be no rear. Pregnancy and rear are out of the interchange of yin and yang, implying plenty of male offspring. The area on both sides of the house is spacious and flat (mat 裀 mattress 褥) and is received by tiny rises on the edge of both sides under the house, called lapels (襟). Of the open area in front of the house, the upper mound field is the lip (唇) and the lower mound field is the felt (毡). Thus the formation of the site of the house is complete, composed of blister, fetal, embryo, breath, pregnancy, rear, mat, mattress, lapel, lip, and felt. The peaks overlap and accumulate at back to embrace and protect the ribs (脇) on the two sides with range layers, and the boundary waters are distinctive. The dragon vein is flourishing with breath, which is smoothly hidden. This indicates flourishing with male offspring, rank, and nobility for the household. This is an auspicious house which is seated on the grand ancestor (of mountain dragon). Here, the ancestor mountain, the coming range, the transition of dragon vein, the passing through the

gorge, the rise of the peak, the Azure Dragon hill and the White Tiger hill, the facing and table hills, the embracing hills and the water outlet, are all present together.

The mountains at back

For the house, the beneficial noble peak serves as the main peak out of the terrain behind, and it opens to three peaks in a row attached with a screen, similar to that to serve a great noble man to sit before a screen, which indicates enduring noble leisure in a zither hall. As a book has it, the back mountain is similar to the screen attached to the seat, which must indicate civilian officials as ministers and assistants. Master Yang also has it, if the small table and screen mounds supporting at back, they would indicate a court of duke, earl, general, and minister; also, if the small table and screen mounds are accompanied by an auspicious Star Peak (星峰), they would indicate officialdom, rank and nobility for generations. This will be effective from the year Jiazi (甲子 Metal) to the year Guihai (癸亥 Water) of the Upper Cycle. And with Si (巳 the seat position of the entry mountain range and the house), it will be effective from the year Jiazi (甲子 Metal) to the year Jiawu (甲午 Metal) of the Middle Cycle, meaning on the way to azure cloud (青雲 skyrocket to officialdom), full of happiness and fame.

Behind the house, the main peak is at the position of Si (巳 Fire, SES), effective in the years of Si, You, Chou (巳酉丑, the harmonic triplet of Metal) of early Middle Cycle, to those people born it the years of Si, You, and Chou. The twin peaks over Shen (申 Metal, SWW) are both beautiful, effective in the years of Shen, Zi, Chen (申子辰, the harmonic triplet of Water) of the Upper Cycle after Jiashen (甲申 Wood) and to people born in the years of Shen, Zi, Chen. The position of Yin (寅 Wood, NEE) on the right hand side is juxtaposed with the twin peaks, effective in the years of Yin, Wu, Xu (寅午戌, the harmonic triplet of Fire) , and to the people born in these three years. All get on in life. The only shortage is a peak in front at Hai (亥 Water, NWN), and if a peak is added here, we can say that the four peaks of longevity Yin, Shen, Si, Hai (寅申巳亥, standing for the longevity phase of all four harmonic triplets) are completed, which will thrive with incomparable blessing in all three Cycles.

The house illustration

Furthermore, an illustration for the house plan is attached, where every room, door and window, as well as the drainage
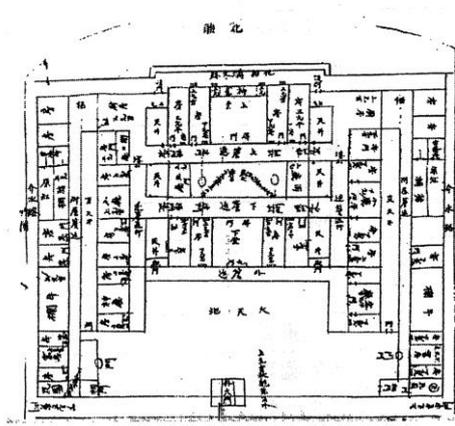
Figure 2. The original plan of the Meihe Villa in the Jifu yanqing. (黃士娟 2006)

holes over the inner and outer courtyards are clearly conveyed. Those doors and windows marked with the Upper Cycle will be effective with blessing from the start of the Upper Cycle until the year Jiawu (甲午 Metal, the start of the second half of the fifth Earth luck and the start of the second part of the 180 years.) Also, the Wood of Hai (亥) generates the Fire of Si (巳), i.e. the fifth luck, and Earth generates Metal of Jiawu (甲午). After then, they should be closed and blocked. Those marked with the Lower Cycle should be open from the year Jiawu of the Middle Cycle until Guihai (癸亥 Water, the last year) of the Lower Cycle, and that will be the most auspicious. After then, the consideration will go back to the year Jiazi (甲子 Metal) of the Upper Cycle. The illustration is also marked with vital (生), flourishing (旺), fair (平) , stranded (困), dead (死), evil (煞) in the three Cycles. Generally speaking, the windows looking to the left hand side and back side of the house compound will flourish and should open in the years of the Upper Cycle until the middle of the Middle Cycle and after then they should be closed and blocked, and those looking to the right hand side and the front side of the house compound will flourish and should open from the years of middle of the Middle Cycle until the very end of the Lower Cycle, and after then they should be closed and blocked.

Why the dwelling, either yin or yang, does not always flourish? It is because the Nine Stars (of the North Dipper) fly in the sky yearly, but the position of the Eight Trigrams on earth are fixed forever. An auspicious star occupying a Trigram in the sky will bring good luck to the location of that Trigram on earth.

Furthermore, the rooms of the human dwelling orientate through the room doors. The window (明窗) of the room receives the energy of the sunlight. If the energy is

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auspicious, then the room will be auspicious; if it is ominous, the room will be inauspicious. This is because the residents lie down and take rest in the room at night. They first open their eyes in the next early morning and receive the sunlight through the window, which means that they receive the essence of the sun and the moon. If they receive vital or flourishing energy because of the presence of auspicious stars in the sky, they will give birth to noble children, and have a fairly stable and safe living. Otherwise, they will feel difficult to grow up, and their living will lack in auspiciousness.

The FIELD SURVEY

Witnessing the scope of a *fengshui* configuration

With the help of the digitalized maps of the past century of Taiwan prepared by the GIS Centre of the *Academia Sinica*, the contents of the *Jifu yanqing* can be checked on site. The cadaster of the Meihe Villa belongs to the Touliao (頭寮) sub Section of the Sanceng (三層) Section. The coming mountain dragon goes through the gorge (鶴膝蜂腰) at Huotankeng (火炭坑) then arrives from the east and its entry section is Mt.Touliao (頭寮山) with its peak at the position of Si (巳). The Azure Dragon hill on the left of the inner table is the hill foot of Mt.Xizhou (溪洲山麓) in the shape of sleeping arch (眠弓) and links to the front of the Villa, and becomes the civilian star of the calligraphy of the Chinese word one. The White Tiger hill on the right hand side is the Mt. Grass Ridge (草嶺山), which also acts as the lion and the elephant that protect the water outlet. The water outlet pit has a mound like carp. The big river (the Dahan Brook 大漢溪) and the sea (the Taiwan strait, about 28 KM from Meihe Villa) embrace the configuration unseen. The Mt. Sandun (三墩山, probably Santun 三屯 in Guanxi 關西, about 8 KM from the Meihe Villa) is the upper outer hill and Mt.Nankan (南崁山, should be Nankan 南崁 today, also called Jianlun 尖崙, which is 155 meters above the sea level and is about 22KM from the Meihe Villa) is the lower outer hill. The Dahan Brook comes from Shimen and is the outer attached water, which embraces the configuration unseen (暗拱) and then goes northward to Daxi (大溪). This survey witnesses the scope and vision of the *fengshui* master and the scale of a *fengshui* configuration. The coming mountain dragon from afar is only conceptual and the gorge that is passed through and the near rise of peak are more crucial. The embryo, breath, pregnancy and rear of the area of vital energy, the Mingtang and the water outlet, the lion and the elephant protecting the water outlet, the inner and outer hills, the attached water of the mountain dragon, the unseen embracing of river and

sea, all together will witness the scope of a *fengshui* configuration in the mind of the *fengshui* master, which was identified as *yexia xiantao* or *xianren sawang*.

On the other hand, some *fengshui* features of the Villa had been altered or fell into oblivion. The water surface of the pond in front of the Villa is covered by water plants. But, those changes are minor and the recovery is still possible, for which the *Jifu yanqing* should be very instrumental.
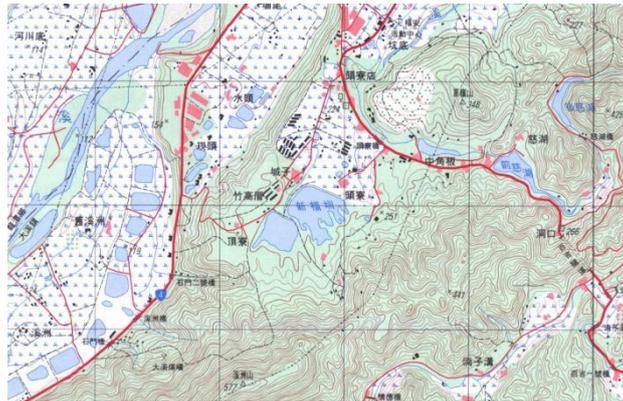

Figure 3. The Meihe Villa (the tiny block on top of the term 頭寮 near the centre of the map. GIS, the Academia Sinica)

The Cultural Significance of the Meihe Villa

The official designation

The Meihe Villa is a cultural heritage, whose designation was officially validated on 27 October 2015 in the category of historic building. The reasons for the designation are three,

1. The main body of the Villa is composed of two layers and four protecting ranges on both sides and its surroundings are completely kept. Thus it is a representative traditional architecture.
2. The Villa bears ornaments of elegance and beauty, including painting, clay sculptures and wood carving.
3. It possesses the historical significance of local development and the values for conservation in terms of craftsmanship for a traditional architecture.

It's a pity that the three reasons have nothing to do with *fengshui*, like tickling the itchy instep through the soles of shoes, as a Chinese saying put it. This should be because the textual knowledge and manipulation of *fengshui* are highly unintelligible

and could not be easily shared by those evaluators, not to say by ordinary people. Therefore, despite the unusual existence of the *Jifu yanqing*, which allows a rare opportunity for witnessing the demonstration of *fengshui* manipulation through a concrete case, the *fengshui* aspects as cultural significance are not recognized, which really touch the rudiments of the formation of the Villa.

Intangible cultural heritage

Apart from the importance of the physical *fengshui* features, which are being disregarded, the intangible aspects of *fengshui* are even more crucial. The definition of "intangible cultural heritage" in *the Convention for Safeguarding of the Intangible Cultural Heritage* 2003 is "the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity." (Article 2) Besides, one of its five domains is: "knowledge and practices concerning nature and universe". (UNESCO, 2003)

This definition is almost like a commentary upon *fengshui.* No one would deny that *fengshui* is "knowledge and practices concerning nature and universe", but it cannot be clearly defined, easily performed or witnessed. Otherwise, it is highly potential for the designation of an intangible world cultural heritage. In this regard, the *fengshui* aspects should not be ignored in the evaluation for such a case as the Meihe Villa.

Conclusions

In this paper the author has scrutinized the *fengshui* prescription *Jifu yanqing* and confirmed the *fengshui* features of the Meihe Villa. It is a very good example for mutual illumination of *fengshui* between its knowledge system and physical formation. The result also witnesses the scope of a *fengshui* configuration in the mind of the *fengshui* master, which was identified as *yexia xiantao* or *xianren sawang*. Although the Villa has been designated as a heritage building, it's a pity that the *fengshui* aspects were disregarded at evaluation for its cultural significance. These aspects are the rudiments for the physical formation of the Villa and should be more crucial and

meaningful than those three reasons for heritage designation.

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WEAVING TRADITIONAL ECOLOGICAL KNOWLEDGE INTO INDIGENOUS YOUTH EDUCATION: A CASE STUDY IN AN INDIGENOUS RICE PADDY CULTURAL LANDSCAPE, TAIWAN

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Abstract

The study aims to analyze the development processes and outcomes of an informal indigenous youth education program in the Cihalaay rice paddy Cultural Landscape of the Fon-nan village, Hualien, Taiwan. To understand the ways and interactions of stakeholder participation, the strategies and difficulties of the course development, as well as the process and outcomes of the course implementation, this study employed the theory of collaborative planning and the qualitative research methods of date collection including, participant observation, individual interviews and group discussions. The findings show that the indigenous youth education program was planned based on traditional knowledge and involved economic, social, ecological and cultural resources of the whole area rather than a specific professional aspect. Collaboration and complementary relationship between local teachers and the research team was the key to the curriculum development and operation. Most local young students obtained sense of belonging, cultural identity and confidence through the courses. Continuing notice and involvement of the students' parents in the process and outcome of the courses could get significant supports from the parents. Relevant financial supports from the governmental projects was important to sustain the courses specially in the beginning stages.

Key words: youth education, community-based environmental education, cultural landscape, collaborative planning, action research

Background and research goals

In 2005, the idea of landscape/seascape conservation was introduced into the amended Cultural Heritage Preservation Act (CHPA) as a new legal subject entitled a "cultural

landscape" in Taiwan. The cultural landscape is a new concept to Taiwan that emphasises the interaction of local people and the land (IUCN 1994, 2010; Phillips 1995, 2002). In order to help the stakeholders of governmental authorities and local communities to apply this new instrument, the National Dong-Hwa University (the research team) worked with the Hualien County Cultural Affairs Bureau (HCCAB) and conducted a two-year action research project from May 2011 to June 2013 (Lee, 2012; 2013).

The Cihalaay Cultural Landscape, the case study area, covers a land area of 1,040 hectares and is located in the Fengnan village, Fuli township, Hualien County of Taiwan. The boundary of the Cihalaay Cultural Landscape is a complete watershed of the Stonehouse Ravine Stream that is situated in the northernmost area of the Turtle Stream watershed. Right next to the landscape is the 1682-meter high peak, Ma-lao-lou, of the Coastal Range. The area is covered with rice terraces and irrigation channels and is home to the indigenous Cihalaay community. Downstream of the Stonehouse Ravine Stream is the core area of the entire cultural landscape, with 20 hectares of rice terraces and six irrigation channels totaling 4,100 meters in length (Figure 1; Lee, 2012; 2013).

Various formal and informal forums and workshops were facilitated by the research teams and conducted in the local area to achieve stakeholder consensus on the designation of the Cultural Landscape and the formulation of its management plan. As a result, local people voluntarily set up a Local Management Committee in July 2011 and drew up a local Code of Conduct in November 2011 for the future management of the Cultural Landscape. The local authority (HCCAB) officially designated the site as a legal Cultural Landscape in May 2012, approved the Management Principles in November 2012, and completed the mid-term Management Plan for Cihalaay Cultural Landscape in June 2013.
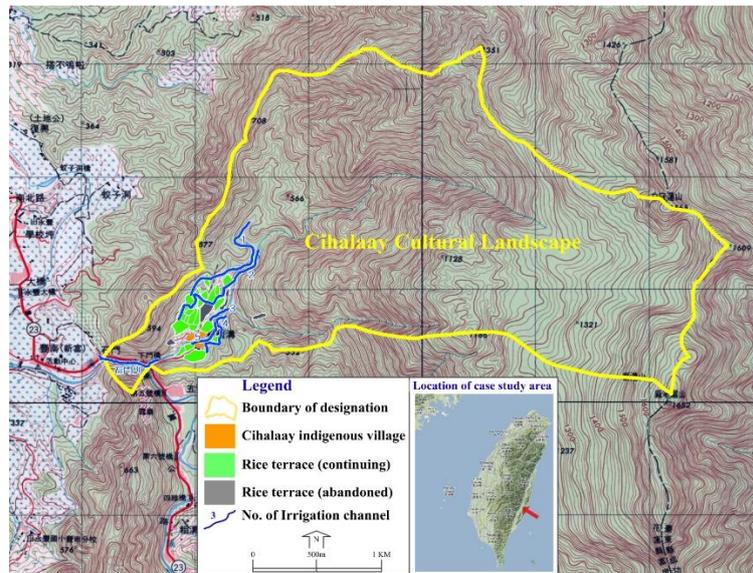
Figure 1. Location and boundary of the Cihalaay Cultural Landscape

Since the designation of the Cihalaay Cultural Landscape, one of the important follow-up activities from the late 2012 was the development of an informal indegenous environmental education (EE in abbreviation) program for local youth. One of the key tasks of the Management Plan for Cihalaay Cultural Landscape is about respect of local knowledge and transfer it to local young people.

The research team worked with the indigenous community on developing and operating an informal community-based EE program from mid 2012. The study aims to analyze the first three-year development processes and outcomes of the indigenous youth education program of the area. The results of this study are expected to provide relevant government authorities, rural communities, universities, local schools, NGOs and other stakeholders with reference so that thay can work collaboratively in informal EE to maintain cultural landscapes and transfer local knowledge to the youth in rural areas of Taiwan.

Research methods and questions

Concerning the theoretical basis, the study employs Healey's theory of collaborative planning (Healey 1997, 1998) that seeks to enhance partnership and achieve consensus among stakeholders through a collaborative planning process. Social capital (relational resources), intellectual capital (knowledge resources), and political capital (mobilisation capacity) are terms used by Healey (1998) to describe "institutional capacity-building", which is a key concept in collaborative planning. The importance and influence of different stakeholders were explored through stakeholder analysis (Bryson and Crosby, 1992; DFID, 2002; Grimble and Wellard,

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1997).

This study employs a qualitative research method (Silverman 2000). The study utilizes a range of different source materials to help maximise understanding of the questions (Flowerdew and Martin 1997). Data collecting methods include document analysis, participant observation, individual interviews and group discussions. Each method provides a particular perspective that illuminates certain aspects of reality (Morse 1994). The multiple-method approach also allows findings to be validated or questioned by comparing the data collected by different methods through a process of triangulation (Denscombe 1998).

The method of transcript analysis of taped group meetings and interviews is based on Huberman and Miles' (1994) interactive model.

This study explores the following research questions:

1. What are the cultural landscape conservation issues involved into the community-based EE program?
2. What are the framework and teaching content of the community-based EE program?
3. Who are the stakeholders to be involved in the development process?
4. What are the processes and outcomes of the community-based EE program in this case study?

Outcomes

After several discussion meetings with local people in the Cihalaay rice paddy Cultural Landscape of the Fon-nan village, Hualien, Taiwan in May 2012, they agreed on the fact that not only should they develop rural tourism to increase income, they also educate the young of their own culture. Consequently, at the start of September 2012, the National Dong-Hwa University worked together with local people to launch a series of EE courses named '*Pakalongay Interpreters Training Courses*' in line with the Satoyama Initiative for the young of the village.

At the outset, the research team and the community teachers had expected to have the courses divided into *Basic, Intermediate and Advanced* Levels, but based on the concept of community-based approach, there was no rush to settle at the content and teaching materials for each level of course. It was hoped that the curriculum for each level could be summed up gradually from experiences learned in the development processes.

Based on the themes, the course content for lessons given between September 2012 and December 2014 can be divided into four major categories, namely indigenous culture, production skills, natural environment and integrated activities, with each of

them composing 29%, 21%, 19% and 31% of the total numbers of teaching hours respectively. Each major theme can be further divided into four to five sub-topics. When glancing over the percentage distribution, one might think that fewer teaching hours were assigned to natrual environment compared to the others; however, the truth is that Amis indigenous wisedom is mostly applied in their daily lives, which means many of the 'natural' environmental topics had already been put under their indigenous culture and production skills. Integrated activities such as outdoor games and interpretation practices were added into the course to make it livelier.

Indigenous culture courses refer to folk practices developed over different aspects, namely food (composing 41% of the total number of teaching hours), clothing (9%), housing (13%), education (19%) and entertainment (18%). Courses of different content were designed, for example traditional Amis food production, traditional headdress knitting, and building of traditional hut in an old-fashioned way and toy making.

Production skills are mainly about agricultural courses which were subdivided into rice growing (accounting for 44% of the total number of teaching hours), vegetable growing (34%), irrigation ditches construction and maintenance (17%) and livestock raising (5%). Agricultural courses can be extended from simply inviting students to particular agricultural activities to a series of courses of planting different kinds of crops depending on the season and timing.

Natural environment courses can be divided into edible plant resources (consisting of 17% of the total number of teaching hours), natural landscape and ecological resources (47%), agro-biodiversity (25%) and water resources (11%).

Integrated courses were founded on the previous activities carried out. They were usually done through cross-theme training integrated with indigenous culture, production skills and natural environment to enhance learning capacity. For example, there were courses on interpretation demonstration and practice (accounting for 32% of the total number of teaching hours), graduation examinations (29%), integrated discussion (12%), nature games and creative arts (14%) and others (13%).

Conclusions and suggestions

1. Course content planned by community residents covered the entire landscape resources: economic, social and environmental

It was discovered that the concept of landscape resources understood by community residents did not necessarily mean certain aspects of landscapes; instead, it covered a wide range of economic, social and environmental resources surrounding the

community. The key concept of a living landscape focuses on interactions between people and the land (Sauer, 1925). Consequently, course topics and content suggested in related community forums and workshops organized by the research team tended to widely cover the whole aspect of resources in the community. It is recommended that the diversity, integrity and daily life features of the landscape resources recognized by residents be carefully considered when it comes to promoting culutral landscape conservation and environmental education and interpretation.

2. Community teachers, parents and the research team are the key to maintenance of course operation

Parents' attitudes have a huge amount of influence over students' participation. In spite of the fact that some parents refused to let their children join the program due to misunderstandings or other personal reasons, and a few parents shirked their disciplining responsibilities to community teachers; most of the parents made a turnabout in their attitudes from banning to supporting their children to participate in the program. Reasons summed up include the following: 1) Community teachers actively communicated and invited parents to participate in the course; 2) Changes in student were clearly witnessed; 3) Students were well taken care of by community teachers on weekends; and 4) The research team assisted in producing weekly Diary and facilitating curriculum planning meetings to help parents understand course content. In the planning and implementation of the course, the complementary relationship between community teachers and the research team is the key to maintaining the operation of the course.

At the outset of cooperation among Teacher A, C and D, they were unfamiliar with one another's teaching style, and there were often situations in which they either initiated talking at the same time or gave different commands to students, resulting in confusion. Fortunately, the three parties recognized the course as a medium to transfer traditional indigenous knowledge to the youth, and therefore were willing to communicate and coordinate their efforts to find a way out. For example, they showed respect to one another by not interrupting the subject teacher in order to allow a better performance and a smooth class. Besides, the research team raised a suggestion to hold after-class discussions which community teachers thought were conducive for understanding each other's ideas, beneficial to cooperation and useful in finding a direction for the course in the future.

3. Sense of belonging and local recognition acquired through community-based EE program

According to interviews, not only did students learn about traditional indigenous knowledge, but they also developed close peer friendships. To students, these are of far-reaching significance. Students in this case study belong to the Amis age group, *Pakalongay*, and community teachers kept reminding them of their age responsibilities and obligations throughout the lessons given such as duties at the Harvest Festival. The age group has even grown to be mature and responsible enough to care for their younger siblings. Students who gained promotion to a higher age level in August 2014 not only continued to participate in the course, but also led their younger siblings in learning under teachers' authorizations. It is obvious that age concept has already made an influence on students and started to show results. The community teachers hoped that local youths could understand community literature, life and traditional skills from various angles; obtain sense of belonging; support and protect the community, take up the responsibility for community development, cultural heritage and guard the mountains in the future.

4. Planning and implementation of community-based EE program are moving towards collaborative planning of multiple stakeholders

Planners of the community-based EE program changed from only community teachers into cooperation between the research team and community teachers. There were even two times in which parents, community residents, and the related governmental instititutions were invited to contribute ideas at course planning meetings during implementation of the Fon-nan Community Forestry Program. A partnership platform involving participation of stakeholders such as the public sector, teachers, and students' parents was successfully established and a complementary foundation was formed. What's more, the Research team successively sent invitations to experts of related fields to give lessons for the program, and encouraged exchanges between experts and community teachers to share their knowledge. Through interactions community teachers grew confidence in teaching and students showed recognition for local knowledge.

5. Financial resources from the public sector can enrich course content

Resources available and financial supports from the public sector are the most indispensable to the implementation of the community-based EE program in Fon-nan Village. They enabled the program to be promoted in a continuous and steady way, provided the possibility of diverse teachers who contributed his or her own expertise (knowledge and skills), assisted the division of work and inter-communication, and established a new institutional capacity among stakeholders.

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THE EVOLUTION OF MANUFACTURING EQUIPMENT AT MODERN SUGAR REFINERY FACTORY DURING JAPANESE COLONIAL PERIOD: CASE OF SUGARCANE SQUEEZER

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Abstract

Japan colonized Taiwan in 1895. Japan made Taiwan an inception of becoming the Kingdom of Sugar in the early 20th century. Nowadays, only little sugar heritage at that time is preserved as sugar industry has declined. The regeneration industry becomes more and more prevalent recently. This study will regard the sugar industry as a landscape of whole cultural, and then extract the narrative which is related to modern industrial development in Taiwan. We found a lot of sugar equipment which is passed down from Japanese colonial period when we were checking the existing 12 sugar factories. This study will focus on the squeezing equipment as the object of study since squeezing is an important process of producing sugar and the squeezing equipment is much more preserved among sugar production equipment. We use industrial archeology developed since the 1950s as a method to guide our study here. Also, we check the archives left from Japanese colonial period. On the other hand, we also do field research, studying existing equipment from Japanese colonial period.

Key words: Industrial Heritage, sugar factory, Industrial Archeology, Japanese colonization, Taiwan, squeezing equipment

Preface

Taiwan's industry, especially sugar industry, had entered into a new era after Taiwan was colonized by Japan. Sugar was a luxury in Qing Dynasty while it was often had by gentry. However, in the beginning of Japanese colonial period, Taiwan had focused

on the development of sugarcane as a cash crop after Japanese government implemented the policy of "Agricultural Taiwan, Industrial Japan" under the imperial colonialism. When sugarcane was made into sugar, it could be exported to Japan or other countries. At the end of Japanese colonial period, Taiwan was the fifth largest producer of sugar in the world. As for the export of sugar, Taiwan was ranked third in the world. Therefore, Taiwan could be seen as the kingdom of sugar. Nevertheless, Taiwan's sugar industry had declined due to the influence of the instability of international sugar prices and the fact that farmers started to grow rice. Thirty sugar factories were removed among the forty-two sugar factories one after another. And only two sugar factories in twelve sugar factories are still producing sugar.

Nonetheless, when we were checking the remaining twelve sugar factories, we found that much more sugar manufacturing equipment, especially sugarcane squeezer, was preserved nowadays. The squeezing efficiency directly affects the amount of sugar so the sugarcane squeezer is one of the most important machinery in the process of producing sugar.

Evolution and Methodology of Industrial Archeology

Industrial archeology is one of the most important methodologies which study the industry heritage. The academic community defines industrial archeology as "a systematic study of structures and artifacts as a tool to expand our understanding of the past of the industry." Domestic industry cultural assets have just started, with less emphasis on industrial archeology methodology, whereas in the past, there was less understanding of industrial archeology. Therefore, the track of past development and its methods were briefly described.

The development of industrial archeology

UK is not only the origin of industrial revolution, but also the beginning of industrial archeology. The development of industrial archeology does not originate from the study of colleges, but from those who are interested in of different fields, starting the research and preservation campaign for the industrial age.

"Industrial Archeology" was officially proposed by Michael Rix in 1955. In 1959, the Industrial Archeology Research Committee was set up, but most of them were voluntarily put into investigation by various local groups or individuals. From 1960 to 1970, five open-air museums for industry culture were established one after another. The Association for Industrial Archaeology (AIA) was established in 1973. The Royal

Commission on the Historical Monuments of England (RCHME) officially included the inspection of the industrial sites into the routine work items, and the complete and systematic investigation as well as the construction and inventory of the database were finished in 1981.

From the development of industrial archeology, we know that its method is mainly applied to industry heritage. Therefore, the method and scope of industrial archeology will be summarized as follows.

The research method and scope of Industrial Archeology

Industrial archeology mainly uses previous archeology research method as the starting point, with the historical documents to further confirm the location of industrial objects and mode of operation. Firstly, fieldwork in industrial archeology and the historical data are as follows:

1. Fieldwork: (1) Make a form to list the object name, quantity, materials and equipment introduction, mechanical drawing, photos, mechanical details. (2) Fieldwork mainly focuses on measurements and records. (3) Equipment: measuring gauge, lighting equipment, cameras, drawing tools, markers (sign or standard stick). (4) Recording methods roughly can be divided into text records, drawing records, and photographic records.

2. Literature or documents: (1) It is essential to get local history information, the relevant data of society, or the available manuscripts and photographic resources of local courts. (2) Find available documents from the region, such as publications, Publications, visual materials, historical investigations, oral history, local government records, and manuscripts.

    Through the cross-reference of field work and historical documents, we can restore or explain the historical context and value of the industry heritage at that time.

The current squeezing process of sugarcane squeezers and the evolution from the Qing Dynasty to the early Japanese colonial period

After introducing the development of industrial archeology and its methodology, it is still necessary to understand the squeezing process of sugarcane squeezers and the evolution of the sugarcane squeezers in the early Qing dynasty.

In the process of producing sugar, it is necessary to go through a series of processes of squeezing, precipitating, cleaning, evaporating, crystallizing, and separating. Squeezing sugarcane is the most vital part of producing sugar and the squeezing

efficiency directly affects the amount of sugar so the sugarcane squeezer is one of the most important machinery in the process of producing sugar.

The process of squeezing the sugarcanes
After transporting sugarcanes to sugar factories, they have to be squeezed first. The operation of the squeezer is that the turbine drives the gear wheel of the squeezer and then drives the three rollers of the squeezer (aka three-reel squeezer) to start the squeezer. However, squeezing out so much sugarcane juice does not happen overnight, but over the past hundred years and can be traced back to the Qing dynasty.

The evolution of sugarcane squeezers from Qing dynasty to Japanese colonial period
They squeezed sugarcane by the sugarcane car at old sugar workshops in Qing dynasty, sugarcane car shaped in the stone "plate" placed on a pair of wheels called "male and female stone car" (also known as stone wheel). Generally, there were about 2-4 granite wheels, and each wheel was about 25 inches in diameter, 30 inches high. Each wheel had a pinion groove, with hardwood teeth, in order to drive another wheel, and 2-3 cattle together pulled the stone car. Only a few hundred kilograms were squeezed in one day, and the squeezing rate is only 50-60%.

At the beginning of Japanese colonial period, the Taiwan Office of the Governor-General set up the improved sugar workshops to ensure the basic economic policy of "Agricultural Taiwan, Industrial Japan" based on the effectiveness of land development in Taiwan during the Qing Dynasty. In order to achieve this goal, the government improved agricultural production techniques by importing small squeezers to replace the cattle power. There are three kinds of the improved sugarcane squeezers in workshops, such as Ohio, 烏魯拉式, and Niles. Ohio and 烏魯拉式 weigh up to 5-6 tons. Niles was much more complicated and its mechanical structure was similar with the mechanics at the early new sugar factory. Also, it was different from the other two squeezers since it was able to squeeze up to 22 tons.

The mechanical history of the new sugar refinery factories during Japanese colonial period

Taiwan's first new sugar refinery factory was founded in Qiaotou in 1902 by Taiwan Sugar Company. However, it was constructed by assembling, including the sugar machines in Britain, France and Japan, so the quality of sugar is poor. Therefore, Taiwan Sugar Company ordered the sugar machinery from the Hawaii Iron Works of Honolulu (Honolulu Iron Works) in 1907 to build up the second factory in Qiaotou

and it was the first set of new sugar machinery equipment in Taiwan.

Except for Taiwan Sugar Company, other sugar companies in Taiwan also had ordered the sugarcane squeezers from Europe and the United States.

We used "List of sugar machinery in each sugar company" (《臺灣各社製糖工場機械要覽》) for research, and listed all the squeezer manufacturers at sugar refinery factories in Taiwan. We can confirm several points from the data:

1. There were 52 sugarcane squeezers in Taiwan in 1936, 32 of which were constructed during Meiji Restoration period; they were imported from America, Britain, and Germany. After Taishō period, Japan was gradually able to manufacture the squeezers. However, Taiwan was able to manufacture the squeezers after Taiwan Iron Works was established during Shōwa period.

2. The squeezers imported from Europe and America possess special requirements. Take top four sugar companies for examples. Taiwan Sugar Company preferred the squeezers from Honolulu Iron Works in Hawaii, USA; Meiji Sugar Company imported most squeezers from America, Britain, and Germany; Dai-nippon Sugar Company preferred the squeezers from Germany; Ensuiko Sugar Company preferred the squeezers from Britain and Germany.

3. After Taishō period, Japan was gradually able to manufacture the squeezers. A total of 29 squeezers were manufactured by Japan itself at 52 sugar refinery factories. Take top four sugar companies for examples. Meiji Sugar Company and Dai-nippon Company preferred the squeezers manufactured by Kobe Steel. However, the squeezers in Wanli Sugar Factory (Shanhua Sugar Factory) were manufactured by Taiwan Iron Works.

After that, we refer to "Asset Inventory" (《資產清冊》) which was checked by Taiwan Sugar Corporation. We found that the squeezers of Xihu Sugar Refinery Factory, Rende Sugar Factory, Huwei Sugar Factory, Shanhua Sugar Factory, Taitung Sugar Factory were all from Japanese colonial period through "Asset Inventory". In addition, we found that the sugarcane squeezers at 4 sugar refinery factories among the existing 12 sugar refinery factories were also printed the logo of the manufacturing company, and even time. They were Qishan Sugar Factory, Xihu Sugar Factory, Shanhua Sugar Factory, and Nanjing Sugar Factory.

After referring to the actual measurement and the inventory, we took Xihu Sugar Factory for example. In "List of sugar machinery in each sugar company", it not only

recorded the manufacturing age and company, but also recorded the mechanical size and the capability of squeezing at each sugar refinery factory. We compared the "Asset Inventory" of Xihu sugar factory with diameter and length, and the Xihu factory in "List of sugar machinery in each sugar company" has a diameter of 802-870mm and a length of 1676mm, respectively. The diameter and the length in "Asset Inventory" are respectively 812 -889mm and 1676.5mm. The former director of squeezing room, Zhan Wang Ji, pointed out that its length 1676mm matched the proportion. Therefore, he inferred that the squeezer at Xihu Sugar Factory was a squeezer which had been preserved since the Japanese colonial period.

Conclusion

In Qing dynasty, they introduced the method of stone-based squeezing from China. After that, they introduced techniques from the United States and improved the method of stone-based squeezing into squeezing of petroleum vapor at the beginning of Japanese colonial period. Then, they built large new sugar refinery factories and imported the squeezers from other countries in order to squeeze more sugarcane. We could learn that most of the squeezers of Britain, Germany, and America were manufactured during Meiji Restoration period. Moreover, we could know that Japan was able to manufacture sugarcane squeezers during the Taishō period. Then, Kobe Steel and other sugar machinery companies were set up. In 1919, after the producing technique of sugar machinery was mature, the sugar company also invested in the establishment of Taiwan Iron Works to manufacture sugar machines in Taiwan; after 1928, they set up sugarcane squeezers at Wanli Sugar Factory (called Shanhua Sugar Factory now).

Finally, we could confirm that Shanhua Sugar Factory, Xihu Sugar Factory, Qishan Sugar Factory, and Nangjing Sugar Factory possess the sighs of Japanese colonial period. Therefore, there were squeezers which were persevered since Japanese colonial period at Rende Sugar Factory, Huwei Sugar Factory, Taitung Sugar Factory, and the above mentioned four factories among the existing sugar factories.

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PRESERVATION AND REUSE OF CULTURAL HERITAGE SPACES REVITALIZED THROUGH CULTURAL AND CREATIVE INDUSTRIES[57]

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Abstract

In the past few years, a trend has been observed in Taiwan, which is to integrate the reuse of cultural spaces with cultural creativity. Some successful examples include: the Hayashi Department Store, etc.. Other countries have similar projects for the creative renovation of old buildings. In Hong Kong, the "Revitalising Historic Buildings Through Partnership Scheme" has emphasized the importance of integrating cultural creativity with the reuse of cultural heritage. Through integration with cultural creativity, the preservation of cultural heritage revitalizes its original function and value. In this manner, cultural heritage is no longer perceived as a heavy historical burden and culture is regarded as a new economic industrial capital. Hence, the present study postulates that integrating the value of these cultural heritage spaces with cultural and creative industries promotes economic benefits for the society through proper management. Such an approach is the most suitable mode of operation for cultural heritage spaces.

The reuse of cultural heritage is oriented towards the development of cultural creativity. Therefore, this study believes that the crucial professional ability required to manage cultural heritage spaces pertains to knowing what preserving cultural heritage means, as well as how to develop and operate a cultural creative space.

Specific competencies include understanding the concept of cultural heritage preservation and the existing regulations, as well as the practical applications and constraints; furthermore, creative planning abilities are essential. Cultural heritage spaces have different characteristics, on the basis of which operators will decide the practical work necessary for their preservation, as well as which static and dynamic activities to plan according to their distinguishing features. This even includes curatorial marketing of the virtual spaces. If cultural creativity is implemented in the reuse of cultural heritage, competencies for managing cultural industries are also required, such as financial management analysis, merchandising, event planning, manpower management, warehousing, logistics, and market research. Therefore, the present study considers the necessity of managing cultural heritage spaces and, through cultivating talents and assessing competencies, hope to provide cultural heritage with an everlasting and sustainable vitality.

Key words: Cultural Heritage, Cultural Creativity, Conservation, Management

Preface

In recent years, Taiwan has actively promoted policies for the preservation of its cultural heritage, so that numerous local and traditional cultural assets may be preserved and revitalized. This not only advances the process of preservation but also allows people to improve their understanding of the environment in which they live and to become more conscious of their land, as well as to promote their local identity. However, because increasing numbers of heritage spaces exist, they tend to lack competent managers once restored and consequently lose their intrinsic value. In other cases, these cultural spaces are left unused for a long time for lack of suitable personnel.

Usually when cultural spaces are operated inappropriately, it is because of an alienation from the original ideas of preserving their cultural heritage. Moreover, if cultural spaces are managed in a narrow-minded fashion, they end up being used in a limited manner or reduced to an appendage of over-commercialized activities. At present, the main problem in the preservation and reuse of cultural spaces is that the operators of these spaces, as well as the tenants, lack the basic concepts necessary to preserve cultural heritage. They tend to merely use these spaces for commercial purposes to seek profits, and consequently damage the cultural heritage. Moreover, they lack cultural creativity and efficient planning, which limits the potential of

reusing the cultural heritage. A cultural space that is not properly operated in regard to preservation and reuse loses its efficiency.

The trend of integrating the reuse of cultural spaces with cultural creativity in Taiwan and in Hong Kong

In the past few years, a trend has been observed in Taiwan, which is to integrate the reuse of cultural spaces with cultural creativity. Some successful examples include: the Hayashi Department Store, now a part of Tainan's cultural heritage; the Former Old Tainan Magistrate Residence, now a municipal historic site of Tainan City; the Ten Drum Rende Creative Park also in Tainan, which had been left unused for a long time; and the Hualien Cultural and Creative Industries Park. These are all examples of old buildings that have been revitalized and, through cultural creativity, they present innovative ideas that create new trends in a modern or retro fashion. The Hayashi Department Store is a refined and elegant five-storey building with a yellowish brown facade. It used to be a luxury department store. People used to throw sweets and candies from the windows during Chinese New Year; these are just some of the memories that are contained in the walls of this old building, which has thus become a part of the Tainan people's collective memory. The Former Old Tainan Magistrate Residence is another valuable cultural heritage site from the Japanese colonial period. These two historic sites are currently operated by the Tainan Enterprise Culture and Arts Foundation, and through the ingenuity of cultural creativity, they have become two new cultural landmarks in Tainan. The Ten Drum Rende Creative Park in Tainan and the Hualien Cultural and Creative Industries Park are on the sites of old factories and have retained many of the original factory facilities and buildings. The operators wanted to transmit the values of their industrial heritage; therefore, they combined cultural creativity, arts, and the history of industrial production to create something extraordinary. The preservation and reuse of these cultural heritage spaces have become critical resources for enhancing the visibility and competitiveness of local tourism. Simultaneously, they have brought about a new type of cultural wealth.

Other countries have similar projects for the creative renovation of old buildings. In Hong Kong, the "Revitalising Historic Buildings Through Partnership Scheme" has emphasized the importance of integrating cultural creativity with the reuse of cultural heritage. Through competitive procedures, Hong Kong has invited non-public sector organizations to submit proposals for old buildings, selecting operators based on the following criteria: (1) reflects historical value and technical

aspects; (2) possesses value for creative industries, society, and social enterprise operations; (3) is financially viable and other considerations; and (4) possesses management capability and other considerations. The Hong Kong Heritage Conservation Foundation Limited (HCF), a nonprofit organization established in 2008, won the tender to revitalize and convert the Old Tai O Police Station into a boutique hotel surrounded by the ocean view and characterized by colonial-style architecture. The hotel is one of the cases in the first stage of the HKSAR Government's "Revitalizing Historic Buildings Through Partnership Scheme". The former Old Tai O Police Station, which was built in 1902 and graded as a Grade III historic building by the Antiquities Advisory Board, has been restored and refurbished as the Tai O Heritage Hotel. It has nine suites, a rooftop café, a library, and an exhibition venue to showcase the history of the Old Tai O Police Station[58]. Another successful example, which is being revitalized at present, is the Former Police Married Quarters on Hollywood Road in Hong Kong. The Hong Kong Chief Executive (CE) announced the inclusion of the site in one of eight projects under the "Conserving Central" initiative (CE 2009-10 Policy Address). The Hong Kong government collected creative proposals from the public on the revitalization and adaptive reuse of the site. Eventually, they agreed to preserve the site and revitalize it with creative industries, aiming to expand existing creative industries along Hollywood Road and in the Soho District, where the atmosphere facilitates the perfect environment for nurturing creativity. At present, the Former Police Married Quarters on Hollywood Road has become a creative industries landmark called "PMQ." These two cases are examples of how the aforementioned four requirements[59] can be achieved through cultural creativity. Through integration with cultural creativity, the preservation of cultural heritage revitalizes its original function and value. In this manner, cultural heritage is no longer perceived as a heavy historical burden and culture is regarded as a new economic industrial capital.

Therefore, the appropriate manner of operating cultural heritage spaces is to generate economic benefits to balance the high cost of preserving these spaces. In addition, the most crucial point to mention is that the management of cultural heritage spaces should not only prioritize financial concerns; the business philosophy and the

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[58] For more details please refer to Hong Kong Revitalizing Historic Buildings Through Partnership Scheme http://www.heritage.gov.hk/ ［Accessed October 15, 2017］.

[59] For more details please refer to Hong Kong Revitalizing Historic Buildings Through Partnership Scheme http://www.heritage.gov.hk/ ［Accessed October 15, 2017］.

projects carried out must reflect and promote the cultural values of these spaces. Hence, the present study postulates that integrating the value of these cultural heritage spaces with cultural and creative industries promotes economic benefits for the society through proper management. Such an approach is the most suitable mode of operation for cultural heritage spaces.

The relationship between cultural heritage and cultural and creative industries

Article 3 of the Law for the Development of the Cultural and Creative Industries explains that: "The Cultural and Creative Industries referred to in this Act means the industries that originate from creativity or accumulation of culture which through the formation and application of intellectual properties, possess potential capacities to create wealth and job opportunities, enhance the citizens' capacity for arts, and elevate the citizens' living environment." In economics, the professional terminology for the product is "industry" (Chang CH et al., 2010:333). Cultural industries can be regarded as a form of cultural capital (Chang WL et al., 2003:55-56); this capital forms a variety of products through an appropriate production process. Some of these products can be circulated through monetary transactions. Moreover, another vital characteristic of cultural and creative industries is the creativity aspect; for example, that related to the earlier quote of "through the formation and application of intellectual properties."

The concept of cultural heritage not only conveys a function of social inheritance but is also a valuable medium for the notion of self-identity. The concept is tantamount to being the capital of the cultural and creative industries. The so-called application is the transformation of capital into a productive function: the application of cultural heritage in cultural and creative industries is its revitalization and reuse. Therefore, cultural heritage can be regarded as a primitive and noncommercialized capital. In other words, the application of cultural heritage in cultural and creative industries means to develop, through human creativity, a product with a culturally symbolic meaning. To discuss the application of cultural heritage in the development of cultural and creative industries, we must first understand the cultural value and meaning intrinsic to the notion of cultural heritage. Furthermore, understanding the industrialization process behind the production and marketing of these industries is crucial.

The concept of "cultural and creative industries" comes from the transformation of

cultural heritage into an operational economic model to implement the protection, use, and promotion of cultural assets. The United Nations Organization for Education, Science and Culture (UNESCO) uses the following definition: "Cultural industries are sectors of organized activity that combine the creation, production or reproduction, promotion, distribution and/or commercialization of goods, services and activities of a cultural, artistic or heritage-related nature and are protected by intellectual property rights." According to Article 3 of the Taiwanese Law for the Development of the Cultural and Creative Industries: "The 'Cultural and Creative Industries' referred to in this Act means the following industries that originate from creativity or accumulation of culture which, through the formation and application of intellectual properties, possess potential capacities to create wealth and job opportunities, enhance the citizens' capacity for arts, and elevate the citizens' living environment: (1) visual art industry; (2) music and performance art industry; (3) cultural assets application and exhibition and performance facility industry…"

Furthermore, of the sixteen types of cultural and creative industries mentioned in the Law for the Development of the Cultural and Creative Industries, the third is "cultural assets application and exhibition and performance facility industry." The cultural industry referred to here can be explained by another definition proposed by the Executive Yuan. On August 30, 2010, the Taiwanese Ministry of Culture issued a document titled "Content and Scope of Cultural and Creative Industries," wherein cultural industries were defined as operating and managing the use of cultural heritage and the installation of exhibition facilities (e.g., theaters, concert halls, open-air plazas, art galleries, museums, art museums (village), and performing arts halls). The notes explain that: "the use of cultural heritage is limited to the use of the heritage space." Therefore, under such a definition, the classification of cultural industries refers to the reuse of architectural spaces that feature cultural heritage characteristics. In fact, this notion is equivalent to the reuse of spatial cultural heritage that, in the past, scholars used to discuss in the domain of cultural heritage preservation (Lin, 2012: 174–175). Moreover, it is similar to the concept of reuse of cultural spaces as intended in the present study.

In limiting ourselves to such a definition, the content of the present study would be too narrow and limited. Furthermore, it would not clearly explain the industrial application and development of the cultural and creative industries during the reuse of cultural heritage spaces; therefore, this was divided into two major types: (a) considering spatial cultural heritage as the carrier of cultural and creative industries;

and (b) developing cultural and creative industries with the theme of spatial cultural heritage. Moreover, a third type exists that combines the others, namely, "the coexistence of the previous two types in the same spatial cultural heritage."

Conclusion：The professional ability of managing cultural heritage spaces with creativity

The reuse of cultural heritage is oriented towards the development of cultural creativity. Therefore, this study believes that the crucial professional ability required to manage cultural heritage spaces pertains to knowing what preserving cultural heritage means, as well as how to develop and operate a cultural creative space. Specific competencies include understanding the concept of cultural heritage preservation and the existing regulations, as well as the practical applications and constraints; furthermore, creative planning abilities are essential. Cultural heritage spaces have different characteristics, on the basis of which operators will decide the practical work necessary for their preservation, as well as which static and dynamic activities to plan according to their distinguishing features. This even includes curatorial marketing of the virtual spaces. If cultural creativity is implemented in the reuse of cultural heritage, competencies for managing cultural industries are also required, such as financial management analysis, merchandising, event planning, manpower management, warehousing, logistics, and market research.

Therefore, the present study considers the necessity of managing cultural heritage spaces and, through cultivating talents and assessing competencies, hope to provide cultural heritage with an everlasting and sustainable vitality. Through integrating cultural heritage spaces with cultural creativity, we aim to foster competent people who will be able to preserve and properly manage individual public and private monuments, historical buildings, as well as collective dwellings, cultural and creative parks, industrial cultural heritage sites, and military dependents' villages. In this manner, cultural heritage sites can be properly preserved and continue to play a valuable role in the lives of people, both now and in the future, albeit with a different façade.

Fig.1- The Hayashi Department Store, a part of Tainan's cultural heritage, integrated cultural creativity to become a successful example of how to reuse cultural heritage. Photo taken in 2015 for the present study.

Fig.2- An interior view of the Hayashi Department Store. Photo taken in 2014 for the present study.

Fig.3- The Former Old Tainan Magistrate Residence, now a Tainan City municipal historic site, integrated cultural creativity to become a successful example of how to reuse cultural heritage. Photo taken in 2015 for the present study.

Fig.4- Exhibits inside the Former Old Tainan Magistrate Residence. Photo taken in 2015 for the present study.

Fig.5- The Ten Drum Rende Creative Park in Tainan integrated the machinery of a disused sugar mill to develop cultural creativity. Photo taken in 2014 for the present study.

Fig.6- Inside the Ten Drum Rende Creative Park in Tainan. Photo taken in 2014 for the present study.

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Stabilization of Decaying Houses: Strategies for the Conservation of Traditional Settlements in Kinmen

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Abstract

Traditional settlements and its traditional buildings represent one of Kinmen's main distinctive features. In order to preserve the 3,000 and more existing traditional buildings, the Kinmen National Park Administration Office and the Kinmen County Government have been both providing subsidies to encourage traditional building conservation. Nevertheless, vacant buildings remain a common scene in local settlements and are left decaying over time as a result of complicated ownership or emigration of the owners from Kinmen. Out of public health and public safety concerns, the government has been taking an active role in decaying building management in recent years, intervening by managing the buildings. The government used to either demolish the decaying walls or remove and dispose most of the original materials, leaving short walls only. Now, the government tends to stabilise the walls and clean the environment, as long as there is no safety concerns. The traditional structures and building materials can thus be retained to prevent rapid vanishing of the landscape. In this paper, the actions on decaying traditional buildings and stabilisation methods are studied to gain an insight of the strategies and development status of settlement conservation in Kinmen.

Keywords: Traditional Architecture, Authenticity, Demolition, Kinmen National Park

Introduction

Kinmen Island, located in south Fujian Province in China and surrounded on three

sides by land, has been of strategic importance due to the special geographical position. From mid-19th century, in addition to its native Minnan culture, foreign cultures were introduced to Kinmen as a result of the open to international trade in neighboring Xiamen. The contacts with other cultures are reflected in the architectural structures and ornamental styles. Kinmen found itself on the front line between the nationalist and communist standoff after the Chinese civil war in 1949 (Szonyi, 2008), known as Quemoy Crisis. The military control was lifted in 1992. During the forty three years under military control, modernisation was so slow that the integrity of the island's environment was preserved.

When Kinmen was occupied by Japanese troops in 1937 and caught in the cross-strait tension after 1949, a number of residents fled the island to their overseas residences or to Taiwan. The buildings that they left behind were either used by armed forces or entrusted to their families or friends. The buildings were damaged during a few decades of artillery attacks. Following the significant downsize of the national armed forces in 1992, many traditional buildings started to fall in to ruins due to lack in maintenance. In order to preserve the large amount of traditional buildings and to maintain the settlement features, the Kinmen National Park Administration Office and the Kinmen County Government started to offer subsidies to encourage restoration of traditional buildings in 1999 and 2001 respectively. As of 2017, more than 900 buildings have been restored accordingly.

However, there are more than 3,000 traditional buildings in Kinmen, among which those having been conserved remain the minority. A large number of houses are still left decaying in the settlements due to property right issues or lack of willingness to repair. To avoid such decaying buildings affecting public health and public safety, the government started to take action a few years ago. Initially, due to lack of proper planning, most decadent buildings were dismantled, leaving only wall bases. As a result, the original style of the settlement as a whole is diminishing. After reviews, the walls are now stabilised instead so as to ensure basic conservation of the settlement landscape. In this paper, the decaying building management and stabilisation strategies of traditional settlements on Kinmen are discussed through the current settlement and stabilisation practises.

Causes and management of decaying buildings

There are numerous vacant or decaying traditional buildings in every settlement in

Kinmen. Decaying buildings are not rare even in the National Park, the area designated for conservation of traditional buildings and preservation of traditional settlements. The causes are closely related to the history and social development of Kinmen.

Complicated Ownership

In modern days, most traditional buildings built in the 1920s in Kinmen were funded with oversea remittance. During the Japanese occupation in 1937, many residents fled Kinmen and returned to their countries of residence. They were unable to return due to the cross-strait standoff later and had to entrust their relatives and friends with their houses until present day. It is hard to take action on a decaying house when the original owner is out of touch or when an original owner dies and there are many relatives left with a right to succeed his or her properties. As a result, the buildings are left decaying due to lack of maintenance. This is the main cause of the large number of decaying traditional buildings in Kinmen.

Disuse after Withdrawal of Troops

After 1949, massive armed forces were deployed to the villages and stationed in traditional buildings. These privately owned buildings were left vacant after the demilitarisation in 1992. These buildings formerly used by troops have been decaying over time due to disuse and lack of maintenance. A large number of them have been falling into ruins in recent years.

Emigration of Owners to Taiwan or South East Asia

Because of the wars, some original owners of the buildings might have never returned to Kinmen after leaving the island and moved to Taiwan or South East Asia. Their houses have been left unused and uncared for over years, thus falling into ruins. It can also be the case that when a property owner who had been living Taiwan past away and his or her descents has no plans to return to Kinmen, the building is thus left decaying.

No Intention to Maintain or Manage

A traditional building might run down due to lack of maintenance or management in various circumstances, such as the property owner moved away from Kinmen or passed away, his or her descendants do not reside in Kinmen, the owner has another modern building built and left the traditional building vacant, or the owner does not

have funding to maintain the building.

Lack of maintenance resulted in numerous decadent traditional buildings in the villages in Kinmen. The ruins invaded by overgrown weeds became a breeding place of mosquitoes and insects, posing a threat to public health in the village. Additionally, in a neighbourhood with intensive housing and narrow lanes, the collapsed rooftop and damaged walls of a decaying building may put the public safety in danger. Therefore, in response to the needs of public health and building safety management, the government started to take a series of actions on the ruins in 2012, including formulating a "Quality Environment Program." The program is aimed at turning the decadent or vacant buildings into pleasant green places by removing the weeds and stabilising the damaged structures.

Figure 1. Building running down as the military disused the building.

Figure 2. Decaying house due to the lack of maintenance.

Stabilisation

The program to manage decaying houses and unused lands was introduced in 2012 out of environmental hygiene considerations. The initial objectives were to beautify

and tidy up vacant lands in the villages and, therefore, decaying building conservation or settlement landscape preservation was not taken into account. In consequences, after the intervention, the upper part of the walls were always removed, leaving the walls with a short lower part of 120 cm in height, even when the structure was stable and the materials were in good conditions. Such practices led to the loss of the primary visual features of the damaged buildings and a massive clearance of original structures and materials. In the end, the site where the buildings stood became a vacant land with short walls. The architectural style disappeared and the settlement landscape was no longer the same.

To avoid excessive interventions on the decaying buildings, such as always removing wall tops and applying concrete on the floor surface, the Kinmen National Park formulated the "Guidelines for Decaying Building Management, Environmental Beautification and Useless Trees Removal". On the other hand, the Kinmen County Government published the "Intervention Procedures on Decaying Buildings in Kinmen," [60]which requires a vacant house be cleared of unwanted tree. It also requires unstable structures to be reinforced with traditional oyster-shell mortar or mortar mud.

Stabilisation as the Principle

The collapse of a traditional building often starts with a damaged roof. When the roof tiles are broken and the roof is soaked for long time, the wood components of the roof will be rotten and easily attacked by termites. In the end, the roof will collapse. The walls of a traditional building are often made of bricks, stones, or a mix of materials such as bricks, mud, stones. As soon as the rooftop collapses, rainwater would easily infiltrate into the walls before the walls become loosened and tilted. Over time, the walls would cause danger of falling. However, the walls are so crucial to the visual impression of a traditional building that they must be stabilised and maintained. Therefore, to avoid excessive demolition and waste of original components, main principles of the decaying building management program include stabilising the walls, retaining original parts as much as possible and ensuring public safety.

Figure 3. Wall of brick and earth construction.

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[60] Kinmen Daily, 2013, July 13, http://www.caile.tw/node/198370.

Reinforcement with Traditional Mortar

After a ruin is cleaned, the stabilisation starts with repairing loose joints between the bricks and the wall tops to avoid dismantling of the bricks or infiltration of rainwater. Modern materials such as cement mortar can rapidly stabilise the structure and provide water protection, however, cement is an irreversible material that cannot be removed once it is applied to a traditional brick and stone construction, Therefore, traditional oyster-shell mortar is the only option because it is not only reversible but also renders a harmonious colour and appearance on the processed building. In addition, traditional oyster-shell mortar must be applied to the floor after weeds and trees are cleared to prevent massive use of cement, which would be not beneficial to the environment or the overall impression of the settlements.

Rainwater Protection on Wall Top and Surface

The walls of traditional buildings in Kinmen are usually made of bricks and adobe on the upper part and various combinations of bricks, stones or adobes on the lower part. When the walls are no longer covered with rooftop or tilts, the soil in the walls would easily be dissolved by infiltrated rainwater. Overtime, the structure can be damaged as a result. Therefore, traditional oyster-shell mortar has to be applied to uncovered wall top or damaged roof of a decadent building. The unprotected parts of a building must be covered in bricks or tilts as much as possible to reduce the possibility of rain infiltration.

Figure 4. The top of the wall being stabilized with mortar

Auxiliary Structure to Enhance Safety

When the roof of a traditional building is damaged and the load-bearing walls are no longer fully sealed with the rooftop, rainwater may infiltrate easily and cause damages

to the walls. For example, rainwater might wash away soil and mortar in the seam on the inner side, leading to a tilted wall or crackles on the wall. In order to keep the remaining part of a wall from collapsing, if a wall is inclined or severely cracked, a new brick wall will be built to assist an existing load-bearing wall when necessary. The building and settlement style are to be conserved as long as the overall appearance of the wall and not affected and there is no safety concern. In addition, if necessary, simple steel beams and steel columns are installed to support the roof structure and prevent collapse.

Figure 5. Decaying building before being stabilized.
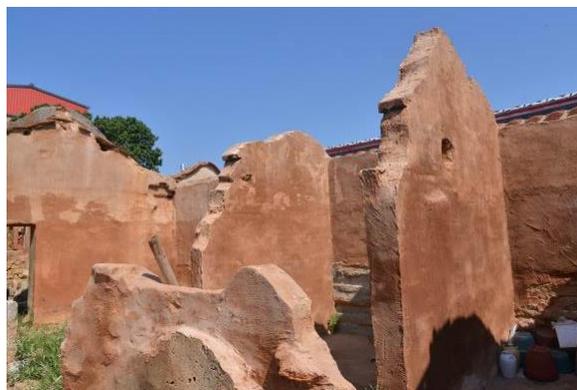
Figure 6. Building being stabilized.

Settlement Preservation Strategy

The style of a settlement is mainly formed from the layout, the environment, the traditional buildings, the spatial features and the visual impression created by the architectural forms, materials and structures. In particular, the iconic impression of the traditional settlements in Kinmen consists of the traditional buildings and their

context, such as lanes and alleys. Traditional buildings play a key part. Therefore, any of the traditional buildings undergoing renovation, demolition or decay will cause a significant impact on the style of the settlement (Tseng, 2016).

Settlements are an important cultural heritage of Kinmen and a holistic thinking should be adopted for the preservation of their landscape and environmental resources. The importance of "setting" to a cultural heritage is a highlight in ICOMOS' Xi'an Declaration in 2005[61]. It is also stressed in the Declaration that when preserving an important heritage, the attention should not be given solely to individual buildings and the importance of the environmental and community integrity should not be overlooked. It states that the threat posed by extrinsic factors to the authenticity, values, significance and diversity of the heritage should be reduced. If the historical and cultural significance and their importance to the settlement texture are not taken into consideration and the decaying buildings are cleaned or demolished in general, such lack of awareness in overall settlement preservation strategy and priority in heritage will severely damage the visual features of a settlement. A resident of Kinmen pointed out that:

> "An old house was always a basis for a successful family or clan and a safe haven for every member of the family ... Every traditional house is a breeding ground and witness of unique and wonderful stories."[62]

Therefore, importance must be attached to the significance of each individual old building to the local development and history of the traditional settlements rather than unplanned action in response to building safety concerns. The removal of damages to original objects or the application of improper materials will impair the authenticity and cause a tremendous impact on the appearance of the settlements.

In pursuit to a sustainable preservation of traditional settlements in Kinmen, involving non-governmental efforts is likely to achieve better results. For example, the management of a decaying building in Bishan Village, the project was subsidised by government funding and staffed by community development society as well as construction company employees and villagers. In principle, existing components were preserved and the decaying building underwent a micro-design (Yan, 2015). The ruin was stabilised, arranged, reinforced and reused. The house was renovated with part of the roof stabilised with modern materials. After the intervention, the house is reused as a public space of the settlement. The original components are retained and

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[61] ICOMOS Website, http://www.icomos.org/xian2005/xian-declaration.htm   (14 Nov. 2017).

[62] Kinmen Daily, April 8,   http://www.kmdn.gov.tw/1117/1271/1276/237191.

may be used to restore the building in the future. The case of Bishan settlement provides an example for others on how to preserve the overall image of a settlement.

Conclusions

Traditional buildings are a result of the interaction between the residents and the environment, a proof of wisdom left behind by the ancestors. Each building tells wonderful stories. In particular, the decades of military control in Kinmen when the buildings were used by the troops left tracks of interaction between the troops and the civilians. The decaying buildings should not be regarded as an obstacle to the everyday safety and the settlement beauty. In reality, their historic, cultural and artistic values should be analysed and served as reference for conservation methods. For the maintenance of settlements, keeping the "incompleteness" status is preferred so as to show its historical culture and authenticity

Renaissance architect Leon Battista Alberti (1401-1472) pointed out in his book "On the Art of Building" that smartly used ordinary materials can be more beautiful than incoherently piled expensive building materials. He argues that rustic country houses with irregular stone structures are themselves coordinated (Jokilehto, 1999). The rustic stone structure and red tiles of traditional Kinmen buildings are indeed, as argued by Alberti, harmonious, elegant and pleasant.

Decaying houses in Kinmen are stabilised on the basis of preserving as many original components as possible and avoiding unnecessary removal and damage to settlement style. The buildings must be reinforced with traditional oyster-shell mortar and other reversible materials in a both environmental-friendly and traditional method while ensuring the possibility of restoration in the future. These are the strategies that have to be followed in preserving settlements in Kinmen. Furthermore, the involvements of non-governmental efforts are indispensable to ensure a sustainable development of the settlements.

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HERITAGE AND DEMOCRACY LANDSCAPES OF MEMORIES: A STUDY OF REPRESENTATION FOR TRANSLOCAL CHINESE CULTURAL HERITAGE IN KAIPING, GUANGDONG, CHINA

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Abstract

After the middle of the 19th century, many young people emigrated from Guangdong to the west side of America in search of a better living. They mainly participated in constructing the Pacific Railroad and panned for gold in California. With the eventual accumulation of their wealth, some of these overseas Chinese sent their remittance back to their hometown to provide their families with a better life or built mansions for their own retirement. They also participated in local affairs, such as renovating ancestral halls, establishing schools, as well as attending to the local politics, public security, and public hygiene etc. The overseas Chinese were one of the important new rising social stratum in modern China before 1960s.

This paper will focus on the translocal Chinese cultural heritage in Guangdong and try to discuss about how people memorize, narrate, preserve, and represent their migration history in the hometowns. Meanwhile, the meaning of the tangible cultural heritage as a landscape of memories in local society in China will also be discussed. Firstly, I think that there are three types of the overseas Chinese memories: the memory of suffering, the memory of making fortune, and the memory of philanthropic image; secondly, I will deal with the narrative and representation of the collective memories after 1990s and check how the collective memory became the cultural heritage beneath the state's discourse; and finally, I will make an analysis of how these overseas Chinese cultural heritage became the resources of cultural tourism and local economic development and point out a process of commercialization of those landscapes.

Key words: Migration, Diaspora Communities, the Overseas Chinese's Hometown, Sociocultural History

Paragraph

Hometown of Overseas Chinese in Kaiping: A Translocally-mobile Society

The middle of the 19th century was the most important historical period for the emigration of the Chinese people. The scale and nature of the emigration and the overseas remittance had great effects on the hometowns of overseas Chinese, the establishment of overseas Chinese communities, and even the revolutions, industries and educational development of modern China. In the emigration wave, the majority of the emigrants were those speaking such dialects as Cantonese, Teochew, Hokkien and Hakka from the coastal areas in the southeast of China; therefore, the social change to Fujian and Guangdong is different from that to other parts across China. From the perspective of sociocultural history, the topic of the role of Chinese emigrants and their economic power in the advancement of Chinese modernization is of high research value.

Situated in the south-central part of Guangdong Province and in the southwest of the Pearl River Delta, Kaiping is one of the renowned hometowns of overseas Chinese. With an east longitude ranging from 112˚13' to 112˚48' and a north latitude ranging from 21˚56' to 22˚39', it neighbors such county-level cities as Xinhui, Heshan, Taiwan, Enping and Xinxing.[63]

Historically, the hometowns of overseas Chinese in the area were called "Siyi", "Wuyi" or "Gangzhou". Normally, "Siyi" referred to Xinhui, Taishan, Kaiping and Enping, while "Wuyi" indicated the above four and Heshan. The old name of "Wuyi" in the late 6th century was "Gangzhou", which was often used to name the guild halls of overseas Chinese. Today, these hometowns of overseas Chinese are also called "Jiangmen Wuyi" which refers to the five county-level cities under the jurisdiction of

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[63] Office of Kaipin Local Chronicles (Ed.), *Annals of Kaiping*, Beijing: Zhonghua Book Company, 2002, p.1.

Jiangmen City, including Xinhui, Taishan, Kaiping, Enping and Heshan.

In other words, Kaiping became a place different from the traditional Chinese agriculture-oriented society since the late 19th century. The prevalence of emigration, the influence of remittance of overseas Chinese, the fastening modernization, and the acceptance of the Western civilization dramatically changed the society and landscape of Kaiping. Also, the translocal emigrants and their cultures fostered the modernization of the local society.

Diaolou: Appearance of Heterogeneous Landscapes

For most overseas Chinese, the houses in foreign countries were merely temporary shelters, and returning home with wealth some day was the dream they strived to fulfill. It was a trend that overseas Chinese would return home to build houses once they became rich. In Wuyi, some even constructed stores, houses and towns of overseas Chinese by making investment in real estate. In the 1920s and 1930s, Western-style buildings (named with "cottage" or "mansion") were established in the hometowns of overseas Chinese in Wuyi. Currently, there are still about 3,000 buildings of this kind in Kaiping. These buildings feature creative designs and different styles -- villa, courtyard, garden and Diaolou. Most of them are a steel reinforced concrete cement structure of two or three stories, and their grandeur appearance shows the combination of the distinctive Chinese and Western architectural characteristics.[64]

As hometowns of overseas Chinese were normally richer than average towns, they were often harassed by gangsters. Poor public security was a serious problem in the hometowns of overseas Chinese in modern times. Therefore, to build a secure home, it was a common phenomenon in the villages of overseas Chinese in Guangdong to combine defensive Dialou with residential building.

From the perspective of social function and two-dimensional layout, the Diaolou can

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[64] Mei, W.Q. and Zhang, G.X. (Eds.), *History of Overseas Chinese from Wuyi*,2001, pp.348-349.

be categorized into three types: the public Diaolou built with money contributed by the public, the three-cottage residential Diaolou with an overhanging top floor, and the Diaolou with outbuildings.[65] The roof of the top floor is the most outstanding feature of a Diaolou, and there are two groups of roofs:

1. The traditional roof

This group includes the gabbled roof, the saddle roof and the pitched roof, which were adopted in earlier Diaolou, as is shown in (Figure 1).

2. The exotic roof

Some roofs are like an Italian dome, similar to the ones during the Renaissance period and the Baroque era (see Figure 2). Some resemble the European medieval church roof, which is large in size and has cross-decorated pinnacles in the four corners; the arcades and the turrets on the surrounding columns highlight the hexagonal roof in the middle, making the Diaolou look like a medieval castle in Europe (see Figure 3). Some are similar to an Islamic mosque roof, surrounded by tower-style buildings (see Figure 4). Some are like a British fortress roof, featuring a cubic body and a cylinder and half-hexagonal watch stand (see Figure 5). Some resemble a Romanian open roof, featuring an overhanging column corridor that includes circular, oval and Gothic exterior corridors (see Figure 6). Apart from the roof, the Western classic arch, the spire window, the rinceau stand-off and the baroque gable are often common.

In fact, these Diaolou are a combination of the regional architectural form of Guangdong, the then advanced steel reinforced concrete materials, and the exotic cultural form. Aside from the roof, decoration featuring the distinctive local patterns is often seen on the parapet walls, the window lintels and the eaves on the top floor. Therefore, it is safe to say that Diaolou is a kind of heterotopias in terms of architectural height, structure, cultural form and symbolic meaning. With the practical function of defense, the exotic Diaolou represent the dream of overseas Chinese -- making fortune abroad; also, they are the results of the overseas Chinese cultural

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[65] Wei, Y.J., Residences in the Hometowns of Overseas Chinese in Guangdong, *Traditional Chinese Residence and Culture*, Beijing, China Architecture & Building Press, 1991, pp.126-129.

practice of glorifying ancestors and making a decent return.
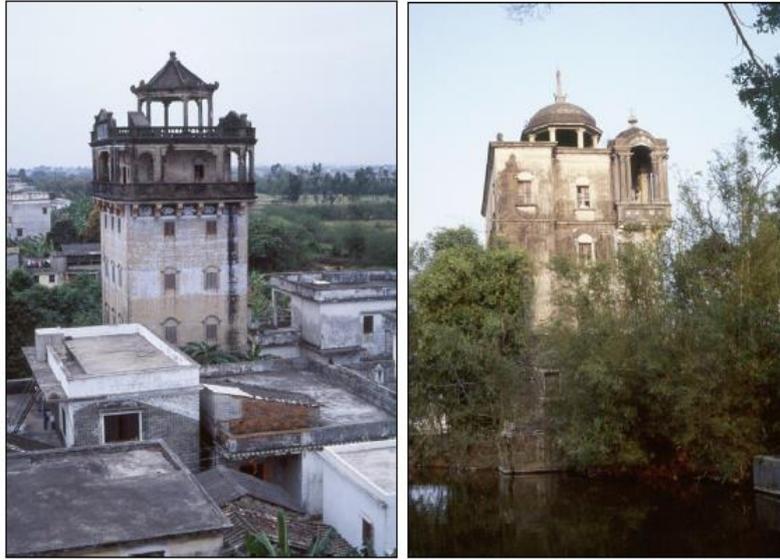
Figure 6 (left) –A Diaolou with a traditional roof: Jixiang Diaolou in Village of Wushanglou, Kaiping County

Figure 7 (right) – A Diaolou with a dome: Shaoxian Diaolou in Village of Zuitou in Baisha, Kaiping County

Figure 8 (left) – A Diaolou with a European medieval castle roof: Shoutian Diaolou in Village of Qingmin in Tangkou Town, Kaiping County

Figure 9 (right) –: A Diaolou with a mosque roof: Baoshu Diaolou in Tangkou Town, Kaiping County

Figure 10 (left) – A Diaolou with a British fortress roof: Yongyiju Cottage in Tangkou Town, Kaiping County

Figure 11 (right) – A Diaolou with a Romanian open roof: Yaohua Diaolou in Chikan Town, Kaiping County

Three Types of Emigrant Memory in the Hometowns of Overseas Chinese

In the hometowns of overseas Chinese, the sufferings of the emigrants who left the original familial networks and living conditions have attracted extensive discussions and become the collective memories of society. The micro history, which originated from individual history, family history or community history, has evolved into the macro history of the hometowns of overseas Chinese and even the nation through the publication of regional annals, the exhibitions in museums, and the storage of cultural relics.

There are at least three types of collective memories about emigrants: the memory of adventure and suffering, the memory of luck and fortune, and the memory of generosity and devotion. These memories are not correlated to each other, and sometimes they are even inconsistent with each other. However, they offer us an important perspective to know about the history of emigration as well as a way to get acquainted with the models of narrating and representing the cultural relics of overseas Chinese.

1. The memory of adventure and suffering

The stories of adventure and suffering are the memory of those who emigrated to other countries.

2. The memory of luck and fortune

In contrast to the memory of adventure and suffering, there were some stories about the emigrants who had the luck and became rich.

3. The memory of generosity and devotion

The industrial development, transportation and education the returned overseas Chinese promoted in the modernization move also evolved into a collective memory of the generosity and devotion of emigrants.

Out of love for their hometowns and motherland, these overseas Chinese donated money for public interest, which greatly accelerated the infrastructure of the hometowns of overseas Chinese and helped to reduce the burden of the government. The history of the interaction between the emigrants and local societies are continually interpreted and represented through story-telling, written record, geographical landscapes and the museums of overseas Chinese.

Conclusion: Commercialization of Historical Resources

As a world heritage, Kaiping Diaolou and villages have become a fascinating tourist destination under the official publicity. They have accelerated the cultural heritage and scenic spots in neighboring cities and counties and created great economic benefits.

To attract more tourists, the local government built the Chikan Movie Town beside the shophouses in the ancient town in 2005. The Chikan Movie Town occupies an area of 60,000 square meters, with a total investment of RMB 20 million. In terms of space, the Chikan Movie Town resembles the modern buildings in the hometowns of overseas Chinese in Kaiping, captivating the attention of many film-making teams. In 2010, *Let the Bullets Fly*, a movie filmed by Jiang Wen, a Chinese director, was set in the Diaolou in Village of Zili and the ancient town of Chikan. With a number of political metaphors, the movie satirizes the corruption in Mainland China. The movie was a great success and the Village of Zili attracted a huge number of of tourists.[66]

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[66] www.xinhuanet.com, "*Let Bullets Fly* Attracts Many Tourists to Kaiping Diaolou in Guangdong Province", January 26, 2011.

As a kind of cultural politics, memory reflects the then social understanding and interpretation of history. As a kind of landscape of memories, cultural heritage is a tangible representation and spatial witness of community history. Its spatial heterogeneity is the result of overseas cultural hybridism. The fact that Kaiping Diaolou and villages were declared as a world heritage demonstrates that the history of the emigration of overseas Chinese and its spatial practice have outstanding universal value and are a chapter that should not be neglected in the world history. The main purpose of heritage protection is to ensure the completeness and authentity of the outstanding universal value and to re-read the relationship between these heritages and the modern society from the perspective of multiculturalism. Therefore, heritage protection is a kind of cultural politics, and making heritage operation public is a protection orientation that China must consider today.

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Figures and Tables

Figure 1 – A Diaolou with a traditional roof: Jixiang Diaolou in Village of Wushanglou, Kaiping County

Figure 2 – A Diaolou with a dome: Shaoxian Diaolou in Village of Zuitou in Baisha, Kaiping County

Figure 3 – A Diaolou with a European medieval castle roof: Shoutian Diaolou in Village of Qingmin in Tangkou Town, Kaiping County

Figure 4 –: A Diaolou with a mosque roof: Baoshu Diaolou in Tangkou Town, Kaiping County

Figure 5 – A Diaolou with a British fortress roof: Yongyiju Cottage in Tangkou Town, Kaiping County

Figure 6 – A Diaolou with a Romanian open roof: Yaohua Diaolou in Chikan Town, Kaiping County

A STUDY FOR APPLYING PHOTOGRAMMETRY TECHNOLOGY TO DIGITALIZE INDOOR SCENE OF MONUMENTS AND TEMPLES

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Abstract

The application of digital technology makes the preservation technology of cultural assets save more time and cost than traditional methods. Photogrammetry modeling technology can offer low cost digital methods and increase efficiency according to scales or requirements for different subject matters. This study, taking the historic building as an example, uses 3D laser scanning and photogrammetry technology to preserve the indoor space; discusses the advantages of applying photogrammetry technology onto cultural assets preservation; and offers operation procedure of photogrammetry and follow-up applications on the photogrammetry low-tech threshold characteristics.

Key words: Photogrammetry, Monuments, 3D laser scanning

Background

The preservation record of cultural assets can be done by using the following technologies: (1) flat scanning, (2) laser scanning, (3) digital image and (4) 3D modeling. The main modeling technologies include laser scanning and photogrammetry. Both rebuild the object by using the collected 3D data; and both have their own advantages. However, the cost of laser scanning is higher than the other. Yet, the photogrammetry technology can choose proper modeling equipment for objects with different scales and requirements. It has the advantages of low-cost, low

technology threshold and rapid modeling.

The foreign photogrammetry technology in cultural assets preservation tends to become mature more and more. There are many researches in setting historic building model by photogrammetry technology. It verifies that the research of the photogrammetry technology applying onto cultural assets preservation is feasible (W. Boehler et al, 2004). For example, Farella et al. (2016) used the photogrammetry technology to establish the semi-amphitheater building of ancient Roman period and suggested various 3D digital modeling methods and showed the results of virtual reality or visual interactive platform. Canciani et al. (2016) established the model of ancient Roman Aurelian Walls by using 3D scanning and photogrammetry technology; and applied the technology onto increasing augmented reality and virtual reconstruction.

The characteristics of low cost and low-tech threshold of photogrammetry technology and the flexible equipment selection let the technology be easily to be learned and popularized to enhance the efficiency and application of cultural assets. Early researches in Taiwan focused on technical computing. Researches for photogrammetry technology on cultural assets modeling are less. In recent years, related applications are gradually implemented. There is no need to deploy many technicians for continuous monitoring; meanwhile, the working efficiency is increased

Digitalization of Photogrammetry

Photos captured via the photogrammetry technology can be made by common digital camera. Such technology can rapidly and completely collect the surface data of objects; and 3D coordinate information is easy to be adopted by software analysis and operation for rebuilding 3D model of the objects. It is the most reliable and most efficient method with advantages of low cost and low-tech threshold.

Equipment Introduction
Photogrammetry equipment used for this study is CANON 5D3, full sensor sized digital single-lens reflex camera equipped with 22.3 millions of pixels. This study makes the accuracy comparison between the photo results and 3D laser scanning results.

Table 1 –Photogrammetry Equipment

Equipment Model	Camera Format	Illustration	Effective Pixels	Max. Resolution
Canon EOS 5D Mark III	Full Sensor Sized Single Lens Reflex Camera		22.3 Millions	5760×3840

Software Introduction

Agisoft PhotoScan Professional can rebuild model with flat images. The 3D model can be set without initial values or camera calibration. Based on the newest multi-view 3D reconstruction technology, even if no controlling points are offered, the software also can orient the image onto 3D model for reconstruction with the photos. It is completely automatic working procedure.
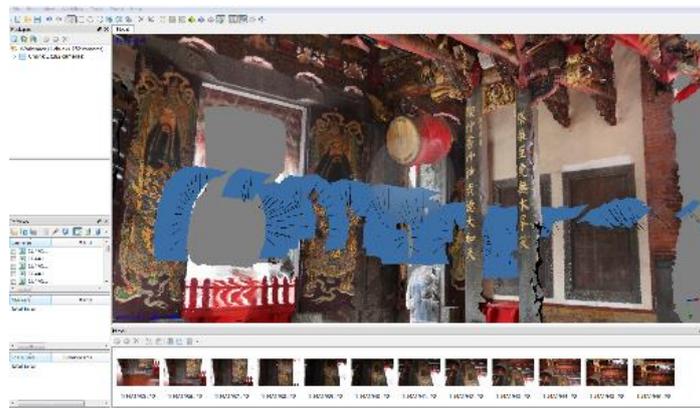
Fig.12   –San Chuan Hall in Xianse Temple (Agisoft PhotoScan)

Digitalization for Indoor Space and Medium-sized Objects

With Agisoft PhotoScan Professional, 3D model for the shot subject can be generated automatically. San Chuan Hall in Xianse Temple (Figure 2) is taken as an example for the indoor room. After shooting from long distance and general direction, the detailed portions are enhanced by shooting with various angles. For the middle-sized object, we take dragon pillar (Figure 3) as an example. Use the shooting techniques from bottom to up and around the object, make 70% of images to be overlapped.

Fig.13 –Shooting path for Xianse Temple Photogrammetry
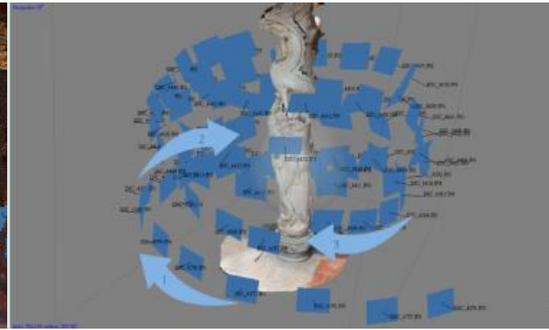
Fig.14 –Shooting path for dragon pillar

Table 2 –Result of Photogrammetry

Subject Matter	Total Number	Shooting Time	Compute Time	Point Cloud Generation	Grid Generation	Texture Generation
Main Hall	155	20 min.	1 hours			
				Dense Cloud (3,616,741 points)	3D Model (216,323 faces)	Texture Mapping mode: Generic
Stone Lion	52	10 min.	9 min. and 46 sec.			
				Dense Cloud (589,404 points)	3D Model (15,517 faces)	Texture Mapping mode:Generic
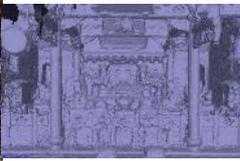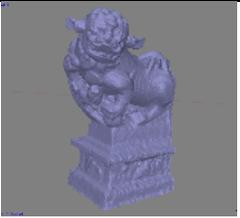
Comparison and Analysis

This study compares and analyzes the San Chuan Hall and the main hall in Xianse Temple by using 3D laser scanning point cloud and photogrammetry point cloud. The accuracy will be in the degree of "centimeter".

Table 3 –Analysis of accuracy

Subject Matter	Comparison results	RMSE	Subject Matter	Comparison results	RMSE
Large Wood Structure San Chuan Hall in Xianse Temple		0.02	Details of Wood Structure		0.002
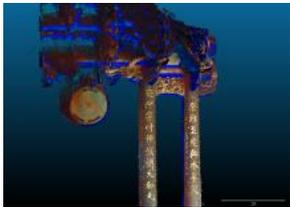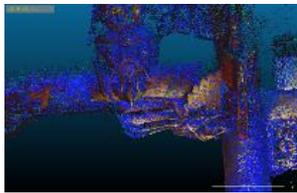
San Chuan Hall

Floor, wall and column position are regarded as location points in photogrammetry result. After zooming in or out, there is no deviation in size. Yet, the top of the framework is sparse. The shapes of gua-tong and bracket set are blurred slightly (Figure 4). Situations such as forming incomplete, upper framework unable to be formed (Figure 5), appeared on the frames on the stone lion socket. As to the stone pillar, too many miscellaneous points appeared while generating the point clouds. The surface of the stone pillar cannot be displayed precisely. As for the base under the stone pillar, an error of 0.89 cm appeared in comparison to the point cloud scanned by laser.

Main Hall

The rafter above the round-edge in the main hall cannot be shaped completely; however the portion of the cross section on cornice is better and completed. Multi-arch is unable to be shown clearly in main hall. Portions on blind angle cannot be formed successfully. The conditions and improving methods influencing detailed result of indoor photos, taking weather as an example, if photo backlit and strong contrast is caused due to strong sunshine, then the black area on the image would be a lot and some parts might not be displayed clearly and original color of the building might be affected. After choosing suitable weather condition for taking a photo and improving too dark of the photo and contrast issue, or using HDR technology, a complete model can be established.
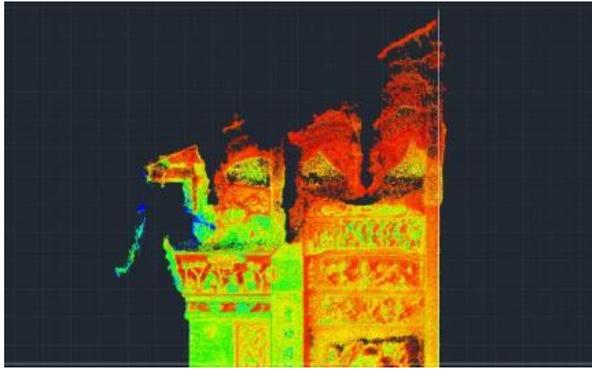
*Fig.15 – Photogrammetry – Mounting Structure of Second Room on Cornice*
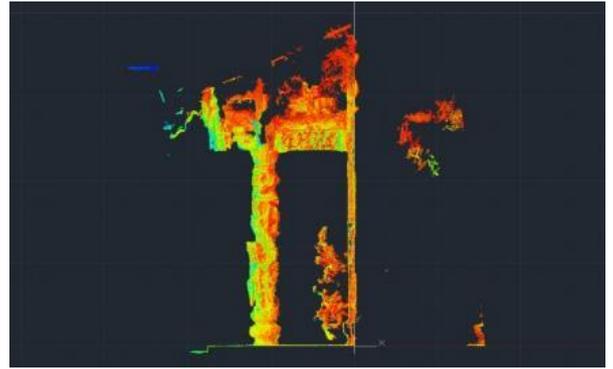
*Fig.16 – Photogrammetry – Cornice*
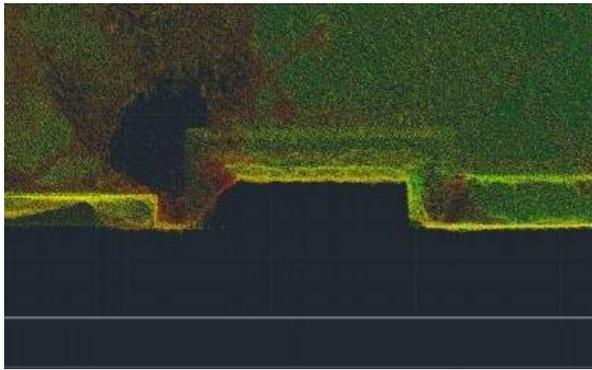
Fig.17 –Comparison for Point Cloud of Stone Pillars on Cornice in San Chuan Hall
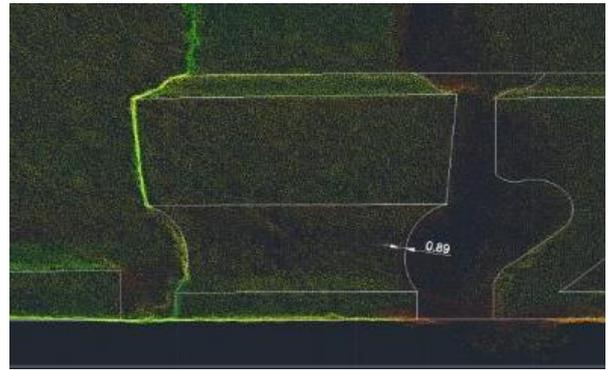
Fig.18 –Comparison for Pillars on Cornice in San Chuan Hall
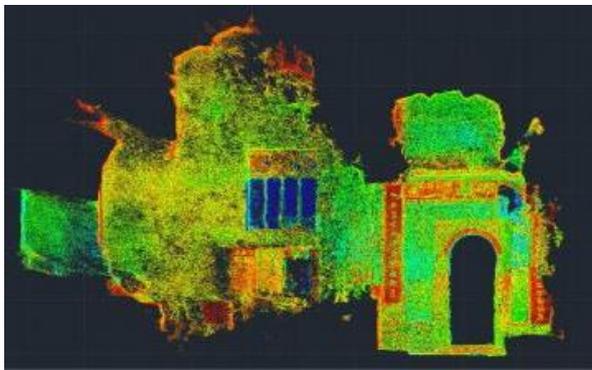
Fig.19 –Photogrammetry – Longitudinal Section Point Cloud of Other Room
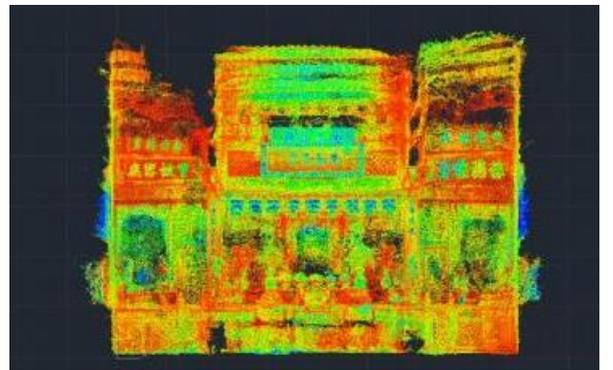
Fig.20 –Photogrammetry – Cross Section Point Cloud of Main Hall

Conclusion

This study discusses the photogrammetry works and methods for indoor scene of monuments. After comparing accuracy between the result made by close-range photogrammetry and the result made by 3D laser scanning, it has certain feasibility for photogrammetry which can increase digital data value and application. In the

future, the wide application and integration can maximize the efficiency, by means of 3D display the human-machine interaction via VR (virtual reality) or AR (augmented reality). The traditional reading mode is changed into user operation with sensory experience information, it can make the information presentation be developed towards multi-dimensional and spatial dimension and it will have the functions of digital learning and educational applications of various cultural assets.

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COMMUNITY ENGAGEMENT AND CULTURAL LANDSCAPE – THE CASE OF LONGAN CULTURAL LANDSCAPE IN SOUTHERN TAIWAN

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Abstract

A rural area may be considered as a cultural landscape with cultural heritage value. It is necessary to work with local community during the investigation stage in a rural cultural landscape, which may consist of various tangible elements need to be recorded and closely relate to people daily life. In the hill area of southern Taiwan, there is a landscape of Longan tree and its roasting stove. To preserve the fruit of Longan, the roasting stove made by earth or stone will bake with low temperature for 7 days, by which the more sweet and rich taste dried fruit is made. In this project, almost 9,000 hectare of land was surveyed. To recognize the area of the cultural landscape of longan and its roasting stove, various ways of recording data with GPS and GIS were used. The most precious data comes from the cooperation of local communities, by which an accurate and detail map of the landscape of longan and its roasting stove was created. Besides, the ideas and concepts of conservation of cultural landscape are also spread through the cooperated investigation process, which will be beneficial for further registration and conservation works.

Key words: Cultural Landscape, Community, Conservation, GIS

Introduction

In the field of cultural heritage, the cultural landscape defined as "combined works of nature and of man". In the system of World Heritage, out of 120 sites were nominated as cultural landscape due to its historic, cultural values.

Three major categories could be identified:

Clearly defined landscape;
Organically evolved landscape: two sub-categories include.
     a relict (or fossil) landscape
     continuing landscape
Associative cultural landscape
(UNESCO World Heritage Centre, 2013)

In these cases, the landscape of agriculture, forest, fishing, hunting or pastoral, is the most significant. Its operation shows the cooperation between human and nature. It may also be considered as a cultural heritage for its cultural and historic significance. These landscapes could be identified as organically evolved landscape – a continuing landscape especially in the system of the World Heritage.

In the landscape of agriculture or others, various elements in it comprise the total image and function. These elements, including tangible and intangible, are also the part of daily life of local people in the landscape field.

Longan Cultural Landscape

Lognan is a tropical tree that produces edible fruit. Although the fruit is eatable, it is usually not able to be preserved and transported. The roasting process may remove most of moisture in the fruit, by which the roasted lognan could be preserved in room temperature. Although the fruit of lognan are not as sweet and juicy as lychee, the roasted lognan is well known for its nourishing function in Chinese Medicine and widely used in food and dessert.

In this reason, in the hill area of southern Taiwan, there is a landscape of cultivating lognan tree and its roasting stove. Especially in Dongshan District, through investigation, more than 1,227 hectare land cultivates lognan which is a highly concentrated area in Taiwan.

The process of roasting could be described as follow:

1. Picking

Traditionally, due to the height, picking of lognan fruits needs specific tools, or by climbing up with ladder. In recent years, trees were dwarfed for picking and cultivating. However, this is still a labor intensive work which is usually done by family member. Cultivated lognan fruits are fresh and along with branches and leaves. Only the lognan fruits removed from branches and leaves, can those be loaded in the roasting stove.

2. Roasting Stove for Lognan

The roasting of lognan is made on a special design stove. The stove has two level: the under level made for fire and smoke, and the upper level for throwing in fresh lognan. Traditionally, these stoves were made according to the hill land, while some is made on a plain now. As for the material of the stove, it usually uses local, convenient, inexpensive material. Thus it could be made by adobe brick in the past, now is probably made by normal brick, while in the more mountainous area it also could be made by stone, by which various forms could be seen. However, there will always have a rooftop on it which looks like a cottage because rain and water should be avoided during the roasting process.

Fig 1. Traditional Roasting Stove

Fig 2. The Under level of Roasting Stove Made for Fire and Smoke

3. Process of Roasting

The season of cultivation always lies on July to September. Once the fruit of lognan is cultivated, it should be roasted as soon as possible. The fruit will be loaded in the upper level of the stove, which likes a tank. In each tank 1,200 kg raw fruit of lognan may be loaded. The roasting process will last for 5-7 days, and farmers will have to stay aside the roasting stove day and night to control the fire.

It can be only roasted by mild fire. Once the fire starts, on the one hand it could not be burned out, it also could not rage on the other. Only the hot smoke curl through the whole stove, by which the moisture inside the fruit is removed, and the sweet taste and smoke smell is retained. After roasting for one day, small branches are already dried. These branches will be cleared by beating, or cut with scissors.

The most important process is overturn of fruits. To make sure every fruit in the tank is well roasted, the overturn process must carry out every day. It includes up-down and front-rear process, and uses specific tools made by bamboo. The overturn process requires strength and skill, however it's difficult for those aged farmers. New crane and basket are designed for the overturn process now, by which the roasting stove and its cottage building has also slightly changed.

After all fruits on the hill is roasted, farmers will clean the stove and have thanksgiving ceremony. The roasted fruits weight only one-third of original, and are carefully stored. Some roasted-fruits will be sold directly, while others will be processed again to remove shell and seeds, by which the flesh is kept and preserved.

Fig 3. Lognan in the Process of Roasting

4. The Landscape of Lognan

It could be considered as a cultural landscape that the cultivation, picking, roasting process and the related facilities. It's a landscape that people use land and environment condition to cultivate lognan, which could be preserved through roasting process, and could earn money through selling products outside the site. It also a significant landscape to represent economic activities on the hill area which is different to those on the plain, which shows the intention of people to work and to use of nature.

Fig 4. Longan and Roasting Cottage

Community and Investigation

The landscape of longan actually is part of daily life of local people. There are also various stories and context inside. The investigation with community people may explore locations of every element in the field. It also may provide a new chance to communicate with local people by which the idea of cultural landscape, cultural heritage, conservation and maintain, may be spread upon local people.

Some key processes of investigation in the project could be summarized as follow:

1. Preliminary Investigation
A preliminary investigation held only by research team is necessary even it is a fast, initial, incomplete investigation. This process will be useful for research team to

understand the place, including appearances, problems, and/or possibilities. In the stage of participated investigation afterwards, community people would also query about the purpose and capability of research team, by which they will provide the information. If the member of research team has no any basic knowledge of local place, it is very difficult to work with the trust and understanding of local community.

In this project, the preliminary investigation was done with GPS receiver on the car, by which the track point was recorded. The location of roasting stove seen along the route was added in the GIS system according the GPS track. Besides, the records in the field and the georeferenced ortho-photo was also used as reference during this stage.
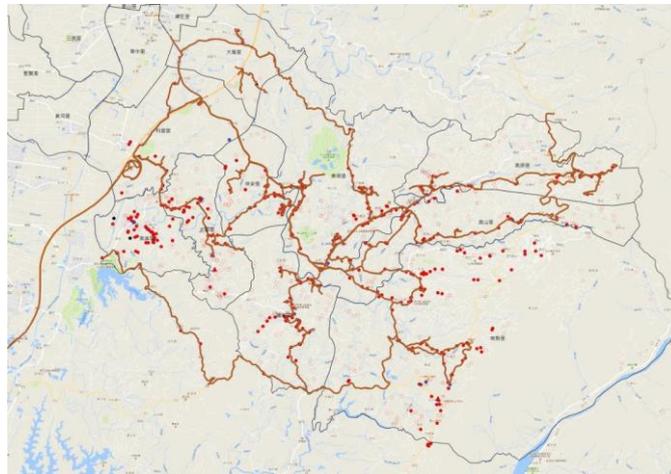
Fig 5. Preliminary Investigation Tracks and Marked Location through Various Information Source

2. Case Study Travel and Meetings in Communities

Before meeting with community people, a case study travel to registered cultural landscape was held for key members of communities. It is expected that the idea of cultural landscape and cultural heritage could be introduced. In fact, those cases of registered cultural landscape are also treasured, even managed by local communities. It is possible to create a platform for mutual discussion which would lead local people to think about problems they may face in the past and in the future. The research team is the introducer to local community, and will provide further assistance.

Meetings were held in every community after the travel. Since key members of community have visited other cases, they have become seed teachers of other people who may provide basic knowledge and experiences. Those ideas spoken from

community members would have more persuasiveness than research team from outside. Participate investigation which will be carried out with people in community in the next stage was also announced.

In this project, there are 9 communities involved in the research area. Cases of other registered cultural landscape and communities in Hualien, Taitung, Pingtung, were visited. By the conversation with host community, it is explained clearly that problems and challenges may face in and after the process of registration cultural landscape. After the travel, 9 meetings were hold in every community, and the idea of cultural landscape and possible influences on local community were clarified.

Fig 6. Case Study Travel to Hualien

3. Participating Investigation

Public Participation Geographic Information Systems (PPGIS) is a way in people's participation in public affairs and in community development. In the case of indigenous people area, PPGIS would be a useful tool for empowerment of local community(Lin et al., 2008). By which some valuable geo-information will be gathered through local people, and this may empower local people for future planning and development. However, the research team decided that the research would be held only by introducing the location of roasting stove by local people, while other equipment was operated by research team. It is because most of local community people are elder people who are not familiar to new technology, and there is no efficient internet service in some area which is essential for accurate positioning. In this stage, the purpose of investigation will focus on the position and quantity of each roasting stove, other information and stories may be acquired from massive interviews at the same time. For these reasons, the traditional participate investigation model is used, and detail positioning is made through portable GPS receiver.

The participating investigation is held by research team and local people. The major feature of this method could be concluded as follow:

(1) Through the local participation, the research team may go deep into the local community.
(2) Local people, especially for the community in the country side, have well understanding of detail of their own community. Since the social network in the local community is usually complex and close, some stories other than the style or material of roasting stove may be reported, even the owner is not at the site.
(3) Local people, especially those who joined the case study travel, have already held basic knowledge of cultural heritage and cultural landscape. In the social network of local community, it is better that the discussion between local people, than the announcement from research team or government. It will be useful for the transmission of the idea of conservation and helpful for government authorities in the future.

However, the participating investigation is built on the mutual trust between local people and research team. Especially those key persons in the community, who are trusted by local people almost for their life time, should be protected by the research team during the project. It is the responsibility of research team to follow the research ethics and reflect to the trust of local community. In the government commissioned project, it is also necessary for research team to understand different conflict between government and local all the time, and provide transparent and public information to each other. Besides, this work required long term accompanying with local people. The continuous trust and partner relation between research team and local community may be created through solving problems every time.

In this project, out of 23 times of participating investigation were held, one to four local people helped each time. Besides the location, owner information, other operation style and method, constructers' information were also acquired through numerous interviews. The recorded information may be presented and analyzed through GIS tools.

Fig 7. Participating Investigation with Community People

4. Results and Analysis

More than 600 roasting cottages and 1,600 roasting stoves were recorded in the project.   Every cottage may contain 1 – 8 roasting stoves. The style and material of stove, retaining wall, stove bank above the tank, stove bed in the tank, and crane is recorded and categorized. Besides, the age and name of owner and constructer of stove is also recorded and presented. By this information, it could be explored that the relation due to geographical and/or other cultural factors. These data may be also combined with other information, such as possible conservation strain, geological threats and etc., which will be the important platform for managing the whole site of cultural landscape.
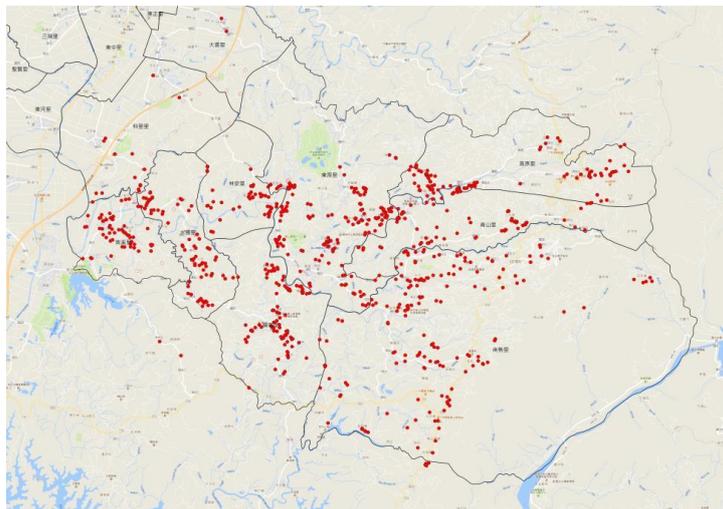
Fig 8. Location of Roasting Cottage through Participating Investigation

Conclusion

Different to other architectural cultural heritage, a cultural landscape is formed by local community for a long period of time. If the conservation work should be done through legal instruments, it is recommended that the cooperation with local people. A good process to engage local community should be started in every stage, such as nomination, management, governance, monitoring, and reporting (Brown & Hay-Edie, 2014). The participating investigation usually not only focuses on the recording of location and phenomenon on the site, but also plays the role of transmission of idea and communication to local people. In this project, not only the situation of roasting stoves of longan is recorded, the idea of cultural landscape and cultural heritage is also well introduced into the community through various meetings and participating local community members. It is noted that at the end of investigation, lots of local people were querying about the results of location and quantities which showed this process had some interventions in local communities, and people were led to be interested in this issue which is closely related to them.

The information and real problems collected through the investigation is valuable. The information and voice acquired through the investigation will be important basic reference for further planning, including the possible promotion projects on economy, tourism, travel, and etc. Besides, conservation of cultural landscape is usually a dynamic process which the conservation of function of the landscape is essential (Wang & Fu, 2014). If the physical element is preserved only, while the function, operation and the relation between local people is missing, it is argued that the core value of a cultural landscape, the interaction of people and nature, will be also losing.

Acknowledgement

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A STUDY ON DISASTER PREVENTION SPACE PLANNING - A CASE STUDY OF QIONG-LIN SETTLEMENT

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Abstract

Internationally, disaster risk management has been integrated into world heritage preservation under the leadership of UNESCO for nearly two decades. In 2015, the third United Nations World Conference on Disaster Risk Reduction held in Sendai included disaster prevention, science and technology for disaster risk reduction and government and community integrated risk management of cultural heritage in the framework for the first time. "Settlement buildings" with the most diverse and complex contexts are research object in this study. The characteristics, values, disaster causing factors of internal and external space, and the setting of fire-fighting equipment of historical buildings and settlements were studied by site survey. Data collected were entered into the evacuation simulation software (Pathfinder) to simulate the evacuation situation of QIONG-LIN Settlement to further understand the disaster causing risk of the space planning and put forward the proposal of spatial planning for disaster prevention.

Key words: Disaster Prevention, Settlement, Space Planning, Pathfinder

Background

The Cultural Heritage Preservation Law revised in 2016 extends from the preservation of a single entity to classifications including fields and groups and starts to put emphasis on environmental conservation. In practice, it is difficult to conduct an evacuation drill for settlement due to limited human and material resources and space environmental conditions. In addition, effective data cannot be obtained through

one single drill. Therefore, it is more efficient to simulate the evacuation situation through Pathfinder. The adoption of the software also possesses several advantages such as low cost and valid data simulation according to different scenarios.

This study applied the basic information collected such as the number of buildings, usage status, main entrances and exits, and refuge spaces to the Pathfinder software. With the time, the escape plan and the route calculated by the Pathfinder software, the following objectives can be achieved: (1) to analyze the planned disaster potential data and to conduct a survey and assessment of the status of refuge facilities and bases for disaster prevention; (2) to evaluate the fire potential, disaster-prone factors and risk distribution characteristics of QIONG-LIN Settlement through simulation as suggestions for disaster prevention space planning of QIONG-LIN settlement;(3) to understand data such as escape time, route and capacity of refuge space in order to review the needs and put forward suggestions for prevention.

Finally, the analysis above was implemented in QIONG-LIN Settlement to identify the shortest evacuation route which should be kept clean and free of obstacles; icons used in the disaster prevention map should be discussed with the public, and map with icons should be set at larger intersections.

Application of evacuation simulation software

At present, there is no discussion on evacuation of settlement in our country. This study at first used the evacuation simulation software for modern buildings: Pathfinder to simulate the situation based on characteristics of settlement. Pathfinder is one of the software developed by Thunderhead Engineering Consultants Company in the United States. Thunderhead makes physical and professional engineering graphical models. Users can quickly make models through their intuitive interface to simulate the actual situation. Pathfinder is mainly used to simulate the evacuation situation of people in a building during a fire. Pathfinder can also be used to create 3D models rapidly and be combined with simulation results of FDS (Fire Dynamics Simulator) to make the fire simulation closer to the real situation.

According to the site survey, data such as configurations of building space, refuge space, personnel, and building entrances and exits were entered into the software. Two assumed situations were simulated :(A) people could escape through all roads; (B) roads affected by disasters and risk factors were blocked.

Scenario A	*Scenario B*

Evacuation situation of dilapidated houses and vacant buildings

Evacuation situation of abandoned buildings

Evacuation situation around historic buildings
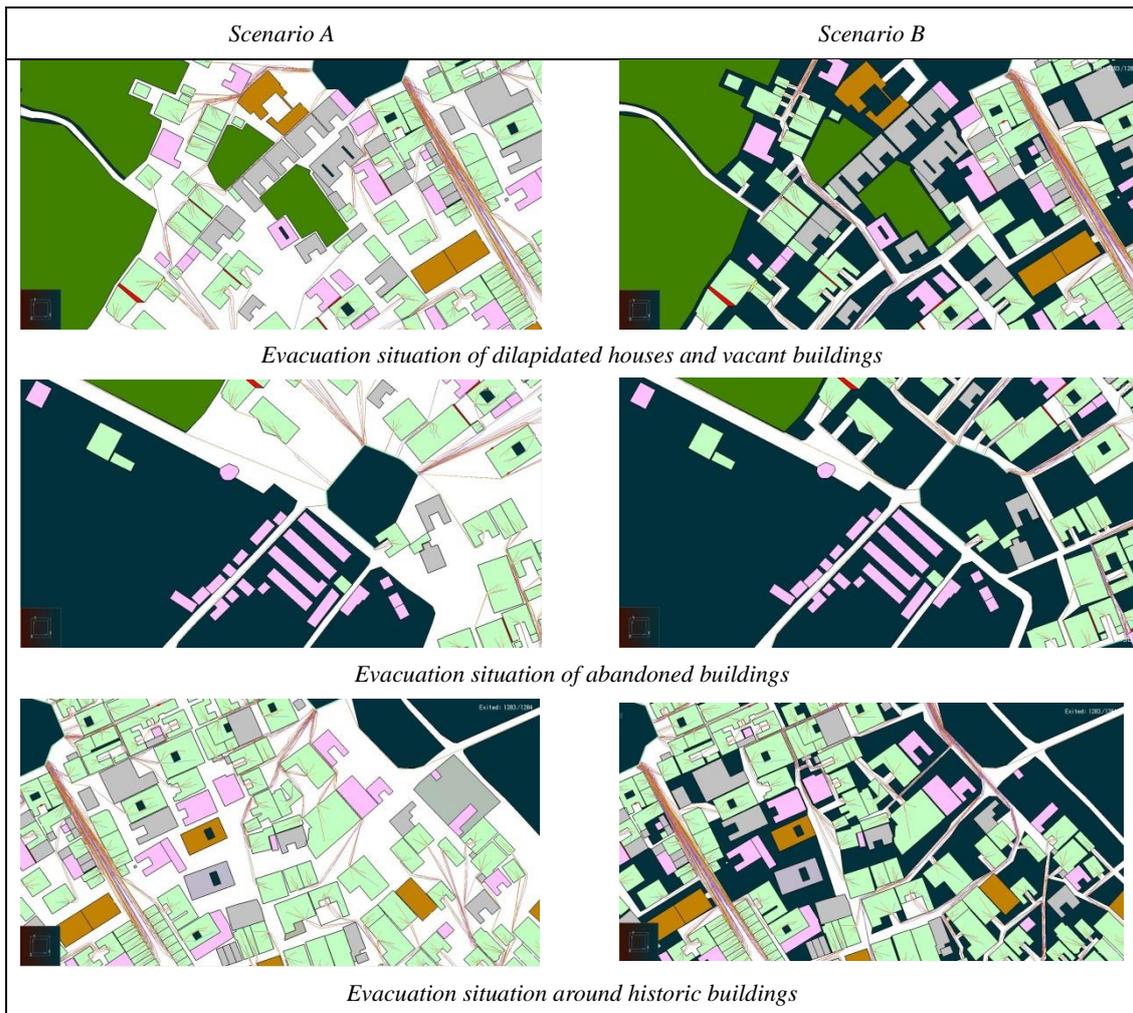
Fig.21 —Comparison diagrams of evacuation situations for Scenario A and Scenario B

Simulation results

Through simulations of scenario A and scenario B, this study compared the differences in movement time and path of people between two scenarios. The combined analysis of different refuge space positions was also used to identify the most efficient and suitable location to construct temporary refuge spaces.

The evacuation simulation results analysis is as follows:

1. Simulation results for refuge space planning:

Refuge space	Capacity	Scenario A	Scenario B	Area
1	640	78	60	B
2	564	82	104	B
3	559	56	80	B
4	824	124	160	C
5	380	112	80	C
6	226	156	112	C
7	1045	68	68	A
8	560	152	156	A
9	489	100	108	A
10	1061	356	356	A、B、C

a. In the two scenarios, the number of evacuees did not differ significantly in the area A. On the contrary, there are differences in areas B and C mainly due to the impact of the blocked roads.

b. The number of evacuees in the two scenarios did not differ significantly among the refuge spaces.

c. The actual number of evacuees among the refuge spaces differed significantly from the potential capacity number.

d. The number of evacuation exits was reduced to save human resource and space.

2. Simulation results for selection and configuration of refuge spaces:

Refuge space	Capacity	Scenario A	Scenario B	Area
2	564	120	142	B
4	824	173	246	C
6	226	225	160	C
7	1045	68	68	A
8	560	218	252	A
10	1061	480	416	A

a. Select the more suitable site as the refuge space from close nearby areas.

b. The refuge space with more capacity is preferable.

c. Finally, six refuge spaces were taken as representatives: 2, 4, 6, 7, 8, and10.

3. Time required for refuge:

With refuge space site space planning and application of Pathfinder software, the simulation and analysis results of 10 temporary refuge spaces and 6 temporary refuge spaces in the two scenarios are as follows:

Scenario	10 temporary refuge spaces	6 temporary refuge spaces	6 temporary refuge spaces (When the number of evacuees exceeds the total capacity)
Scenario A	7 minutes and 35 seconds	9 minutes and 6 seconds	9 minutes and 59 seconds
Scenario B	7 minutes and 40 seconds	9 minutes and 48 seconds	9 minutes and 48 seconds

a. When the number of refuge spaces was 10, the time difference between scenario A and scenario B is only 5 seconds. Therefore, blocked roads did not have significant impact on escape time.

b. When the number of refuge spaces was six, the time will increase by more than two minutes in both scenarios. Although reducing the number of evacuation exits could save resources and manpower, it increased evacuation time and distance.

c. When the number of refuge spaces was six, the time spent in scenario B would be longer than the A scenario by about 42 seconds.

d. When the number of refuge spaces was six, there would be excessive number of evacuees towards Exit-6. Therefore, Exit-6 was set to closed when reaching to full capacity. The time increased approximately one minute mainly due to impact of simulation settings. The evacuees initially took Exit-6 as a refuge, but they must move to other refuge spaces when they almost reached there because Exit-6 was closed due to full capacity. The escape distance and time thus increased.

4. Essential evacuation route planning

The evacuation route planning focused on 6 refuge spaces with the assumption of scenario A and scenario B evacuees moving situation.

Evacuees in scenario A were free from road restrictions. Therefore, all of them chose the shortest route to escape to refuge spaces. A preliminary analysis showed that some routes were taken by most people.

Evacuees in scenario B were restricted by blocked roads. They must take another

route instead of the original available route. This situation resulted in increases of escape time and evacuation distances.

From scenarios A and B, the study identified that non-main roads were required to adapt to new evacuation circumstances (Four new ways of escape(number 1- 4)) when the original available roads were blocked. Therefore, the disaster prevention and rescue space planning also needed to be reconsidered.

Fig.22 –Essential evacuation route planning

Conclusion

Most settlement are early important development areas and thus characterized by historical layers in the environment. However, they become high-risk areas of fire easily due to old buildings, flammable building materials, narrow roads and dense building, etc. The disaster prevention space planned in this study aims to ensure self-help capabilities of people in this area as soon as a disaster occurs and also to encourage residents to understand the nearby refuge spaces, evacuation routes and material spatial distribution.

The public and the private sectors shall cooperate with local public to formulate the content of the disaster prevention space planning which focuses on enhancing residents' awareness of disaster prevention and related safety behavior and emergency evacuation knowledge.

For route planning, the shortest evacuation routes were identified through simulation of the Pathfinder software. These routes should be kept clear, and every obstacle should be removed immediately. For the index planning, it is necessary to discuss with local people to establish operational disaster prevention maps through public participation.

This study suggests deepening the research on the disaster prevention and risking management platform for historical block space. Through digital technology, various disaster risk management and simulation data for historical blocks can be created. The disaster prevention and risk management platforms for historical blocks can also be established by 3D GIS technology.

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