International Conference 2013

"Revisiting the Philosophy of Preserving Wooden Structures:
Restoration Method for Wooden Structures and Its Philosophy"

(17 – 19 December, Nara, Japan)

Cultural Heritage Protection Cooperation Office,
Asia-Pacific Cultural Centre for UNESCO (ACCU)
Agency for Cultural Affairs, Japan

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Excursion: Restoration site at Shonen-ji Temple

Excursion: In front of Middle Gate at Horyu-ji Temple, UNESCO World Heritage site

Preface

Since 2000, Cultural Heritage Protection Cooperation Office, Asia- Pacific Cultural Center for UNESCO (ACCU Nara) has been holding International Conference every year for the purpose of promotion of specialized research and exchange of opinions relating to cultural heritage protection. This conference is a collaborative effort among Agency for Cultural Affairs, Japan; Nara National Research Institute for Cultural Properties; and WHITRAP Shanghai, the UNESCO Category 2 Centre. In the past three years, the conference was held under the general theme of "Human Resources Development for the Transmission of Traditional Skills," and the discussions were continued with the sub themes of "National Approaches and Their Application to Woodworking" for the first year, "National Approaches and their Application to Stone and Brick" for the second year, and "Building Decoration with a Focus around Painting and Colouring" for the third year.

During the discussions held in those three years, we reaffirmed the importance of transmission of traditional skills, procurement of traditional materials, and human resources development. However, there remains the key issue of how its integrity and authenticity could be assured, which reminds us of Nara Document.

Toward the year 2014, which is the 20th anniversary of Nara Document, we would like to revisit the restoration methodology of wooden structure in International Conference this year. Though it is uncommon in Japan to see partial or total dismantling of the structure, we hear there remain critical remarks toward this approach among other countries even today.

Taking this critical analysis into consideration, we believe it is meaningful to have a discussion with a global perspective, which led us to hold this year's conference under the theme of "Revisiting the Philosophy of Conserving Wooden Structures: Restoration Method for Wooden Structures and Its Philosophy."

Also, we take a great deal of interest in how the philosophy and practice of restoration has been apprehended, transformed, and developed in each country after Nara Document. We hope that the discussions will be developed on what kind of philosophy to be applied as we deal with the restoration of wooden structures in the future.

Finally, I would like to extend special thanks to all those who have given support in regard to holding this conference, beginning with the Agency for Cultural Affairs, Japan (Bunkacho); International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), the JAPAN ICOMOS National Committee; the Japanese Association for Conservation of Architectural Monuments (JACAM); the Nara Prefectural and Municipal Governments.

NISHIMURA Yasushi

Director, ACCU Nara

Preface

Respected Colleagues from the Agency of Cultural Affairs, the Cultural Heritage Protection Cooperation Office of the Asia-Pacific Cultural Centre for UNESCO (ACCU), the National Institute for Cultural Heritage, National Research Institute for Cultural Properties in Nara and Tokyo, Japan ICOMOS National Committee, the Japanese Association for Conservation of Architectural Monuments, the Nara Prefectural Government and Nara City, Dear Participants, Ladies and Gentlemen,

On behalf of Professor ZHOU Jian, Director of WHITRAP Shanghai, I am delighted to address you during this opening ceremony of the International Conference "Revisiting Conservation Philosophy of Wooden Structures" starting here today in Nara, Japan.

This conference will be the first under a renewed Memorandum of Understanding between ACCU and WHITRAP, which was extended for another three years in July of this year.
Since our cooperation started in 2010, we at WHITRAP feel privileged to be associated with ACCU and to jointly work towards the mission of UNESCO, which is to build peace in the minds of men through culture, science, education, and communication. The preservation of cultural heritage is an important part of this mission.

Today the international conference "Revisiting Conservation Philosophy of Wooden Structures: Restoration Methodology and Philosophy of Conservation of Wooden Structures" is starting. This will be a precurser to the major conference the Japanese authorities are planning to organize next year, in 2014, in commemoration of the 20th anniversary of the Nara Document on Authenticity.

The 1994 *Nara Document on Authenticity* is defined as an extension of the Venice Charter, one which allows it to adapt to the expanding scope of heritage in our contemporary world.

The Document defines heritage as an expression of the diversity of cultures and links conservation practices to the values attributed to heritage by each culture. In this respect, the concept of authenticity, as defined by the Venice Charter, needs to be understood in relation to criteria, which originate in their respective cultural spheres.

The Nara Document, of course, constitutes one of the milestones in international conservation and is representative of the evolution of the concept of heritage that has taken place in recent decades. It was a document very much ahead of its time. It can be argued that it paved the way for the debates that led to the adoption of UNESCO's Intangible Heritage Convention in 2003 as well as the Convention on Cultural Diversity in 2005.

In my view, the debate on cultural diversity is only now, 20 years after the conception of the Nara Document, starting to come to full blossom and therefore the potential of the Nara Document is yet to be fulfilled. This makes next year's anniversary commemoration all the more important in defining how the message of Nara can be fully implemented.

Now back to our conference today.

In the spring of 1689, the poet Matsuo "Basho" set out on a hike of nearly 2000 km. to the wilds of northern Honshu. His travel diary of this trip, called *Oku no Hosomichi*, or the Narrow Road to the Interior, has become one of the masterpieces of Japanese literature. The year of Basho's journey, 1689, fell on the year of the rebuilding of the Grand Shrine of Ise, which he mentioned in his travel diary. It was Empress Jito who decreed in the year 688 that the Grand Shrine of Ise be completely rebuilt every 20 years.

It is this age-old and lasting tradition in the restoration of wooden structures that we witnessed yesterday when visiting the temples of Shonen-ji and Horyu-ji. It made me feel humble and proud that our discussions here today and tomorrow, and next year as well, will be part of this long tradition.

I wish all of us a fruitful and pleasant conference.

Ron Van Oers
Vice Director, WHITRAP Shanghai

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I. Special Speech

Conservation Philosophy Applied to Wooden Structures

Jukka Jokilehto
Special Advisor to Director-General
ICCROM

Abstract
The paper starts by the key steps in the development of the international doctrine extending from the period following the Second World War to the early years of the 21st century. Through these steps, the approaches to heritage have broadened as reflected in the international doctrine represented by UNESCO's conventions and recommendations, as well as in the charters and documents adopted by ICOMOS. The conservation of something as heritage must necessarily be based on its recognition as heritage, which takes place in the perception of an individual or society. The 1994 Nara Conference became an important paradigm, giving incentives to further elaboration of various concepts, such as the intangible cultural heritage and the diversity of cultural expressions, both later recognized in UNESCO conventions. There is a certain difference in the cultural and scientific approaches to heritage, as discussed by a number of philosophers, art historians and scientists, one approach concerning the aesthetic experience in recognizing a work of art, and the other dealing with natural phenomena. Gradually, these different approaches may have come closer together within the overall international doctrine that represents the principles emerging from the application of conservation theory in practice. It is proposed that the existence and justification of policies based on an international doctrine in heritage conservation must necessarily be referred to universally applicable criteria. This means that there must be one theory of conservation that elaborates the methodology of approach to heritage that is recognized by its specificity representing the cultural diversity of humanity. Such a theory will also be applicable to wooden structures, while obviously the intervention in each case must based on the recognition of the qualities that define the heritage value in each case.

Steps in the International Doctrine
The period following the Second World War can be seen as the period that initiated the development of internationally applicable principles and methodologies concerning the conservation and safeguarding of resources recognized for their heritage value. Indeed, one of the key issues has been the process of recognition of heritage. In this regard, a first step was taken immediately after the WWII, when people became painfully aware of the identity that they had associated with their familiar neighbourhoods, now destroyed. The international meetings sponsored by UNESCO in Paris in 1957 and in Venice in 1964 were the first important occasions to discuss the consequences of the war destruction on restoration and rebuilding.

The 1970s represented another key period in the development of conservation doctrine, seeing the adoption of the World Heritage Convention, and drawing attention increasingly to the need to safeguard the historic urban environment threatened by emerging globalization. The European Architectural Heritage Year 1975 was important in proposing some fundamental concepts, being followed by the advancement of methodologies in integrated urban and territorial conservation. These policies were further stressed in the UNESCO 1976 Recommendation concerning the safeguarding of

historic areas. In 1979, the principles of the Venice Charter found a regional interpretation in the Australian Burra Charter, which introduced the notion of ´space´ to replace the ´monuments and sites´ of the Venice Charter. Other regional and national recommendations followed.

The 1990s became the third key period, offering definitions to the concept of cultural landscape, often associated with vernacular architecture. Wooden architecture had not been given proper attention in the after-war period, and many interesting towns mainly built in timber saw a rapid transformation in multi-storey buildings, as happened e.g. in European Nordic countries, in India, and even in Japan. In the 1990s, the preservation of wooden vernacular heritage was brought to the foreground, resulting in specific recommendations, such as the 1992 *New Zealand Charter on places of cultural value*, and the ICOMOS 1999 *Principles for the Preservation of Historic Timber Structures*. The 1990s also saw the Nara Conference on Authenticity and the adoption of the resulting *Nara Document on Authenticity* in 1994, thirty years from the Venice meeting. The World Heritage Committee has since recognized this document, and it has been included in the *Operational Guidelines for the Implementation of the World Heritage Convention*.

While continuing to be based on the principles already included in the Venice Charter, the Nara Document introduced various issues that have since been understood as paradigmatic in the development of subsequent conservation doctrine. Indeed, the Nara Conference anticipated concepts that were further elaborated in other UNESCO documents. In particular, it stressed the importance of recognizing the diversity and specificity of heritage resources, and the need to respect the values generated by each culture and/or belief system in the recognition of relevant heritage.

In November 2001, the General Conference of UNESCO adopted the *Universal Declaration on Cultural Diversity*, which further developed the statements of the Nara Document. The Nara Document itself listed examples of sources of information for the identification of truthfulness and credibility of references for the associated value judgments. These sources of information also stressed the identification of non-material issues, such as function and use, traditions and techniques, spirit and feeling, etc., which have since been integrated in the UNESCO 2003 Convention of the Intangible Cultural Heritage.

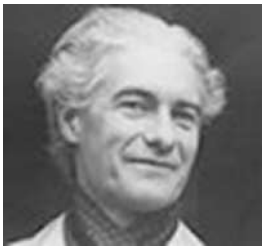
It can also be recalled that the participants of the Nara conference tended to be divided between those who sustained the principles of restoration of monuments in the spirit of the Venice Charter, and others who stressed the somewhat different requirements in conserving vernacular heritage. In 2004, in another UNESCO conference in Nara, the discussion concerned the relationship and eventual integration of the policies expressed in the 1972 and 2003 conventions. In the resulting *Yamato Declaration on the Integrated Approaches for Safeguarding Tangible and Intangible Cultural Heritage*, it was insisted that the intangible cultural heritage was continuously recreated, and consequently authenticity would not apply in the same way as in the case of material heritage. The Yamato Declaration,

unfortunately, missed the notion of the intangible cultural heritage as "heritage." In fact, the meeting did not reach the proposed integrated approach, and consequently some of the issues may need reconsideration in the future particularly as they concern the relationship of the tangible and intangible aspects of heritage.

Recognition of Heritage

Heritage conservation is based on the recognition of something as heritage. Taking a look at the history of conservation, as noted above, it could be observed that much of the timber architecture has been lost due to lack of such recognition. It is really only the later 20th century that its conservation was given more attention. At the time of writing the Venice Charter in the 1960s, one of the principal references for restoration was the *Theory of Restoration* by Cesare Brandi. It had been published in 1963, just a year before the Venice Conference. Here, the emphasis was on the concept of work of art, considered a special product of humanity. Brandi writes:

"The work of art, therefore, is the greatest effort that man can make to transcend his own transient existence, removing himself from time by conforming with the immutable eternity. As soon as the effort is made, however, the work frees itself from its creator, sealed and perfect, freed from the becoming, yet continually drawn into the present of the consciousness that receives it. Born as the symbol of the ineffable, of an interior and secret urgency, it no longer manifests itself in the world as a symbol, a veiled truth that refers to an essence, but as pure reality, devoid of existence. Springing forth as supreme arbitrariness of an individuality which recognises itself without logical justification in the most disparate objects, it manifests itself to the consciousness with the absoluteness of law, the universality of the concept, the inviolability of nature. Nourished during the internal labour of its birth by the most diverse and most stirring emotional reactions, it emerges as a sublime purification of all human passions, a catharsis of man and of destiny." [1]



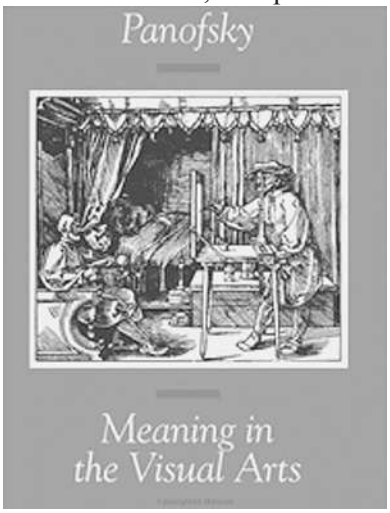
Brandi has always sustained the specificity of a work of art as determined by aesthetics ever since Kant. The Former Director of ICCROM, Paul Philippot notes that there are emerging new currents, which consider that this approach could alienate art from man and from his cultural, social, economic and psychological context. Such movements refer to a new experience in art by the artists themselves, making art self-referential "*art religion"* of modern man. Philippot notes, however, that there is also the art-historical point of view, which states that the work of art only exists as a result of recognition by a consciousness. Therefore,

[1] Brandi, Cesare, 1992. *Carmine o della Pittura*, Editori Riuniti, Roma, p. 51f (English translation by C. Rockwell in: P. Philippot, 'The Phenomenology of Artistic Creation according to Cesare Brandi', in: C. Brandi, 2005. *Theory of Restoration*, Nardini Editore, Florence; p. 31)

something cannot be considered a work of art until it is recognized as such. Philippot explains this from an art-historical point of view as follows:

'On the other hand, from an historical point of view, that of the art historian, the work of art has a remarkable characteristic which gives an evident distinctiveness to the art history discourse within human sciences. Indeed, whatever period the work of art was created in, it gives itself to us hic et nunc*, in the absolute present of perception. It lacks a reality of its own until it is recognised by a consciousness, and this recognition is not the result of a judgment arising from an analysis, but the identification of a specificity within the perception itself and the point of departure for the historian's study. Thus, if art history is possible, it distinguishes itself from other historical disciplines as, rather than recounting the history of an event in the past, belonging to memory, it intends to retrieve the history of a reality that is present in the consciousness.*[2] *In this sense, it is inseparable from art criticism, to the extent that the latter aims to characterise the nature of this particular presence.'* [3]

The renowned German art historian **Erwin Panofsky** (1892-1968), in his *Meaning in the Visual Arts*, recalls that in medieval scholasticism there was no distinction between natural sciences and humanities (*studia humaniora*). These two 'branches' of human knowledge remained within what was called philosophy. Later, they have been distinguished into the spheres of nature and culture, i.e., nature as the whole world accessible to the senses, except for the *records left by man*. [4] Panofsky continues, referring to the difference between natural science and cultural studies:

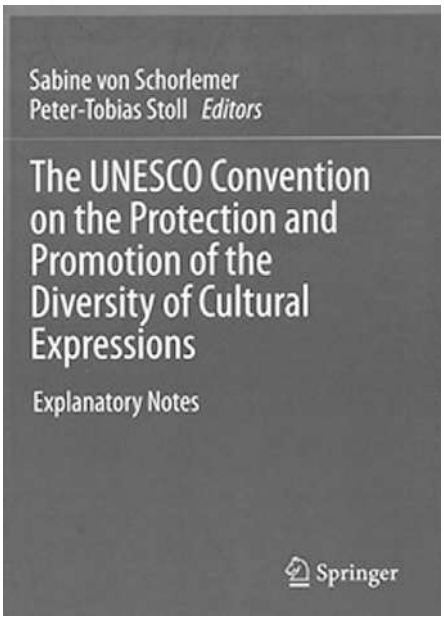


"*In defining a work of art as a 'man-made object demanding to be experienced aesthetically' we encounter for the first time a basic difference between the humanities and natural science. The scientist, dealing as he does with natural phenomena, can at once proceed to analyse them. The humanist, dealing as he does with human actions and creations, has to engage in a mental process of a synthetic and subjective character: he has mentally to re-enact the actions and to re-enact the creations. It is in fact by this process that the real objects of the humanities come into being.*" [5]

The social scientist, **Ted Benton** has discussed the biological ideas and their cultural uses. He distinguishes between two human capacities, one related to human species in general, and the second "*distinctive in that not only its exercise, but its very possession is dependent upon some specific cultural acquisition*." These second types of capacities are multiplied over time as historical. They presuppose the

[2] Giulio Carlo Argan, *La Storia dell'Arte* in *Storia dell'arte* 1/2, 1969, pp. 5-36
[3] Philippot, p. 28 in: Brandi, 2005
[4] Erwin Panofsky, *Meaning in the Visual Arts*, Penguin Books, Peregrine Books, UK, 1970 (first published in 1955), p. 27
[5] Panofsky, 1970: 37f

possession of some natural capacities, while the possession of such capacities neither presupposes nor implies the possession of any historical capacity. "*The systematic exercise of these capacities in a given natural environment constitutes the acquisition of a culture. A historical capacity ... is one possessed by members of only some cultures and which is distinguished from a natural capacity in that its very possession presupposes some specific cultural acquisition*." [6] He also notes that: "*the conceptual position in any scientific discipline at any historical moment is unlikely to be wholly stable or consensual*." (Benton, 1984: 119) The interesting issue in Benton´s thought is that there is something universal in human behaviour and there is also something that is specific to each culture. One can thus ask what is "universal" in the cultures, and what can be seen as universal in the conservation of the cultural heritage, which is recognized for its diversity and specificity.



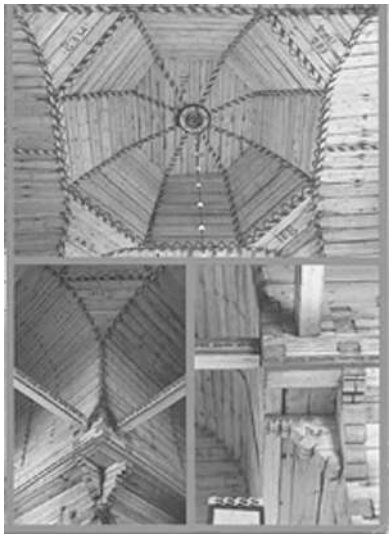
In October 2005, the General Conference of UNESCO adopted a further elaboration of the notion of cultural diversity in the *Convention on the Protection and Promotion of the Diversity of Cultural Expressions*. Here it is affirmed that 'cultural diversity is a definition characteristic of humanity,' and that the various forms of such diversity should be cherished and preserved for the benefit of all. '*Cultural diversity is made manifest not only through the varied ways in which the cultural heritage of humanity is expressed, augmented and transmitted through the variety of cultural expressions, but also through diverse modes of artistic creation, production, dissemination, distribution and enjoyment, whatever the means and technologies used*.' 'Cultural expressions' are defined as: '*those expressions that result from the creativity of individuals, groups and societies, and that have cultural content.'* The Convention recognizes the diversity of cultural expressions as '*an important factor that allows individuals and peoples to express and to share with others their ideas and values.'* The Convention furthermore emphasizes the need to incorporate culture as a strategic element in national and international development policies, and that cultural activities, goods and services have both '*an economic and a cultural nature, because they convey identities, values and meanings, and must therefore not be treated as solely having commercial value*.'

In theory, the role of this Convention can be crucial though it remains to be seen what impact it will have in practice. In any case, it brings to the foreground the need to safeguard the diversity of cultural expressions as one of the principal tasks of heritage conservation. Taking a look at the developments almost in any country of the world, surviving historic settlements are more often than not surrounded by constructions dating from the second half of the 20th century or later. Such results of globalisation do not greatly differ from one country to another, or from one region to another. Instead, they create a uniform habitat that tends to suffocate traditions and cultural identities in the older historic areas. In

[6] Ted Benton, 'Biological ideas and their cultural uses', pp. 111-133: 116f; S.C. Browns (ed.), *Objectivity and Cultural Divergence, Royal Institute of Philosophy*, Lecture Series 17, Cambridge University Press, 1984

this context, the vernacular buildings and traditional timber architecture represent a diversity of cultural expressions, and its safeguarding merits serious attention.

Another aspect of the globalisation is the frequently met attempt to rebuild clichés or replicas of ancient historic streetscapes and monuments, which serve commercial or touristic purposes, sometimes proposing to satisfy the ambitions of wealthy families. In any case, such globalisation tends to cause the gradual loss of authenticity, and the disenchantment in the world, where processes are oriented toward rational goals, often opposed to those in traditional society.[7] The remains of the past have always attracted people, who have associated various values with them also recognizing them as inheritance. Such inheritance can refer to oral traditions and myths, to physical remains, such as objects and buildings, as well as to land and territory. In the past, the issue of tradition was a fundamental reference. Today, it is sometimes transformed into a cliché, and tourist attraction. The question of restoration is however strongly associated with this concept, because it is the 'tradition' that seems to best represent the authenticity of a property.



The word tradition derives from the Latin root: *trado (tradere, tradition, traditor*), meaning: 'to hand over, give up, surrender.' In English it refers to two cases: 1) the transmission of customs or beliefs from generation to generation, and 2) in theology understood as a doctrine believed to have divine authority. From the same root, we also have 'to betray,' and 'a traitor.' Indeed, tradition is referred to betrayal in religion in the sense that specific sacred practices could be handed over to others, thus betraying the original religious community. Discussing the concepts of the German Marxist philosopher **Walter Benjamin** (1892-1940), **Howard Caygill** notes: "*Tradition paradoxically establishes the distance between past and present while overcoming it by delivering them to each other; it both founds and presupposes the time within which it takes place*." [8] Caygill further continues: "*In order for the past to be handed over to the present, it has to be destroyed, made into a different kind of object, one which is past*." [9] For Benjamin, tradition is destruction of the unity and authenticity of what is handed over. However, without this destruction there is no handing over.

[7] Ref. Marcel Gauchet, *Le désenchantement du monde*, Gallimard 1985

[8] H. Caygill, 1994, 'Benjamin, Heidegger and the Destruction of Tradition', pp. 1-31, in: Andrew Benjamin et al. 1994, *Walter Benjamin's Philosophy: Destruction and Experience*, Routledge, p. 13

[9] Caygill, 1994: 19

Caygill further notes: "*For Benjamin, the sacred is the origin of art, of tradition and of traditional (manual) reproduction. This is to say that art carries with it a sacred as a memory and a promise. Technical reproduction perverts the origin – its memory and its promise – to such an extent that it seems difficult to reconcile art with its principle: namely, the general reproducibility of the work. What we know of the sacred we know through the art that technical reproduction destroys in destroying its foundation – the sacred and its unity*."[10]

The term vernacular derives from the Latin *verna*, which means "native slave"; consequently, vernacular building refers to constructions that are born and developed in a particular place, mainly using locally available material and skills. Timber, stone and mud brick are typical materials used in vernacular architecture even though the same materials can also be used in important public buildings. In principle, vernacular architecture is indigenous in terms of time and place, and not imported from elsewhere. It is normally associated with residential architecture. A related term is "traditional architecture," which is referred to building traditions passed down from person to person, generation to generation at any level of society, not just by common people. Traditional architecture can refer to any type of architecture, residential as well as public buildings, while vernacular would usually be referred to more simple residential structures. In each case, the recognition of such building traditions should take into account whether the question is of "living traditions" or of buildings that have retained some traditional forms though not anymore part of the relevant tradition. This will have an impact on restoration policies.

Referring to the concept of tradition in terms of traditional continuity, Benjamin talks about the fact that handing over a traditional practice or ritual also means its destruction. However, a certain form of destruction is seen as a necessary aspect of the handing over. The process of handing over a tradition consisting of practices and skills is a learning process. It means that one has to take over and relearn such practices. Tradition is not made of pieces of stone or timber. It is made of cultural processes. Such processes are not handed over in a static form. They need to be learnt by the new generation. Such process of relearning can be more or less perfect. In any case, it normally involves a certain amount of alteration (destruction), which can be seen as part of the creative capacity of human beings. Through such processes, even thinking of it in terms of traditional continuity, there is gradual evolution until there are events that cause discontinuity. In relation to building traditions, this means that a style is gradually being created through repetition and gradual change.[11] This can be seen as a normal learning process in human culture,

[10] A. Garcia Düttmann, 'Tradition and Destruction: Walter Benjamin's Politics of Language', pp. 32-58 in: A. Benjamin, 1994; p. 50

[11] The question of style has been discussed by art historians from the 18th and 19th centuries; ref. Michael Podro, 1982, *The Critical Historians of Art*, Yale University Press, New Haven and London

a "universal." It reflects human creativity by building on what has been learnt in the past. [12] Therefore, there is a certain constant underlying aspect in culture, as well as a wish to reinterpret the same. Once such traditional continuity is lost, it can only be revived within the new social-cultural context, and then it would be associated with a new significance. E.J. Hobsbawm has spoken about "invention of tradition", referring to situations when a new practice or object is introduced in a manner that implies a connection with the past that is not necessarily present.[13]

Conservation Philosophy

The 1999 *Principles for the Preservation of Historic Timber Structures* prepared by the ICOMOS International Wood Committee recognize the importance of timber structures in their great diversity as part of the cultural heritage of the world. There are already several examples of wooden architecture in the World Heritage List, not only in countries such as Japan and China, but also in Europe, Africa and America. The international doctrine expressed in UNESCO and ICOMOS documents recognizes that a great variety of actions and treatments may be required for the conservation and maintenance of this heritage. Paragraph 4 notes: "*The primary aim of preservation and conservation is to maintain the historical authenticity and integrity of the cultural heritage. Each intervention should therefore be based on proper studies and assessments. Problems should be solved according to relevant conditions and needs with due respect for the aesthetic and historical values, and the physical integrity of the historic structure or site*." And paragraph 6 declares: "*The minimum intervention in the fabric of an historic timber structure is an ideal. Due to the character and particular requirements of timber structures, as well as subject to relevant traditions, their preservation and conservation may, however, require dismantling and subsequent reassembly in order to allow for the repair or replacement of individual members*." Traditional techniques are favoured. Modern techniques and materials should be used with caution after being appropriately tested. It is further recommended to establish and maintain forest reserves as a resource material for conservation and repair of historic timber buildings.

The Nara Document on Authenticity together with the notion of cultural landscape introduced into the international doctrine in the early 1990s by the World Heritage Committee and by the Council of Europe have made this a key period in the conservation of cultural heritage. This concerns particularly the recognition of the diversity of heritage and the diversity of cultural expressions, both recognized by UNESCO in subsequent documents. While this has not necessarily changed the underlying conservation theory, we can nevertheless look at our heritage in a much broader context. The distinction between tangible and intangible cultural heritage has tended to create some confusion, as

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[12] See e.g. Margaret Olin, 1992. *Forms of Representation in Alois Riegl's Theory of Art*, The Pennsylvania State University Press, USA

[13] Hobsbawm, E.J. 1983. *The Invention of Tradition*, Cambridge UP

was seen in the Yamato Declaration in 2004. Indeed, the different UNESCO conventions and recommendations should in reality be seen as forming an international doctrinal umbrella for the definition and safeguarding of heritage. Each element is part of an integral whole that also covers nature as a fundamental part of human existence. An important aspect of the recognition of something as heritage is to look for its significance and meaning in relation to the different sources of information, in line with what was already indicated in the Nara Document.[14]

A challenging issue is to define what is universal in the theory of heritage conservation. In reality, the justification for UNESCO, ICOMOS, and other international bodies to prepare and adopt doctrinal texts for the recognition and safeguarding of heritage must be found in such universality. This is also relevant to international training programmes such as those coordinated by ICCROM. This question is particularly challenging due to the creative diversity that is really the fundamental reason for modern conservation policies. If the significance of each place and each object is basically to be searched in its specificity, how can then its conservation and restoration be based on some universal criteria or on a universal doctrine?

The logical statement to support the question of universality is: THERE CAN ONLY BE ONE CONSERVATION THEORY! What is then this theory?
As noted above, Cesare Brandi refers to the concept of the work of art as a special product of humanity. The idea of a creative process has been accepted by various philosophers, including Martin Heidegger and Walter Benjamin. Starting from the Nara Conference, the recognition of heritage has since evolved with particular attention to the intangible aspects of heritage, and finally the recognition of the creative cultural expression. Indeed, the "creative cultural expression" can be understood as a further development of the notion of "work of art". The UNESCO 2005 Convention on Cultural Expressions offers the following definitions:

- *"Cultural diversity" refers to the manifold ways in which the cultures of groups and societies find expression. These expressions are passed on within and among groups and societies.*
- *"Cultural content" refers to the symbolic meaning, artistic dimension and cultural values that originate from or express cultural identities.*
- *"Cultural expressions" are those expressions that result from the creativity of individuals, groups and societies, and that have cultural content.*

Paul Philippot is one who has insisted on the issue of ONE Theory. He also sustains Brandi, Heidegger and Benjamin in defining a work of art as the result of the process where the "artist" or "designer" gives form to the "aura" or the "world" as an "intangible artistic concept," which is associated with material as a result of the creative process. In view of its restoration, a work of art

[14] See also: K-E. Larsen & N. Marstein, eds., 1994. *Conference on Authenticity in Relation to the World Heritage Convention, preparatory workshop, Bergen, Norway, 31 Jan to 2 Feb 1994*. Riksantikvaren, Oslo

must be recognized in its intangible aspect even though its restoration will necessarily focus on the material. Brandi says: "*Restoration consists of the methodological moment in which the work of art is recognized in its physical being and in its dual aesthetic and historical nature, in view of its transmission to the future*." As already noted above, Philippot gives great importance to the fact that work of can only exist in "*the absolute present of perception*."[15] This means that the work of art only exists as a work of art when it is recognized in its specificity at the present time. This recognition is not based on scientific analyses but on an art-historical recognition. So, to repeat Philippot's words: "*... whatever period the work of art was created in, it gives itself to us* hic et nunc*, in the absolute present of perception. It lacks a reality of its own until it is recognised by a consciousness, and this recognition is not the result of a judgment arising from an analysis, but the identification of a specificity within the perception itself and the point of departure for the historian's study. Thus, if art*

history is possible, it distinguishes itself from other historical disciplines as, rather than recounting the history of an event in the past, belonging to memory, it intends to retrieve the history of a reality that is present in the consciousness." [16]

The theory of conservation does not offer principles of treatment of specific types of structures. This is more the task of the charters and recommendations, which are part of the international doctrine, and of guidelines which may be developed for specific types of heritage structures. The theory of conservation is the underlying approach to the recognition of something as heritage and once recognized it would help to understand what is to be conserved in each case. We can also see the theory of conservation as a methodology. It offers incentives for the right questions to be asked in the different cases. The approach will result from a learning process, and we may be able to continue debating it in the years to come. It is obvious that the theory requires case studies, which document its implementation, and can give feedback to the theory itself. However, neither the case studies nor the principles of conservation are the theory itself. When the 20th century philosophers discuss the creative process, they form the basis for the theory of conservation.

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[15] Brandi, Cesare, 2005. *Theory of Restoration* (English translation by C. Rockwell), Istituto Centrale del Restauro, Nardini Editore, Florence (ref. p. 48)

[16] Philippot, p. 28 in: Brandi, 2005

We can note that the concept of the "work of art," which used to be in the focus in early thinking, could now be replaced by the broader notion of "creative cultural expression." Therefore, the application of the theory of conservation to wooden structures should distinguish the creative cultural expression of such structures, and make sure that these are maintained in their authenticity. This means, quoting the Nara Document, that the sources of information are verified regarding their credibility and truthfulness. We could further discuss the references for such sources, and it would seem that these could be understood in terms of:

1) Creativity & authenticity: taking into account that the question is about creative cultural expressions, which combine the tangible and intangible aspects of heritage;
2) Historicity & authenticity: represented by the material that is subject to weathering and aging; this can also be seen in historical and archaeological research of the fabric;
3) Social context & authenticity: traditional continuity justifies certain types of treatments, and discontinuity traditions would require other types of treatments.

For example, a traditional village (as heritage) can be subject to creative changes and alterations so long as it is part of living traditional continuity. When it becomes a museum village, the treatment would focus on retaining its historicity and its material authenticity. It is interesting to note that the approach to reconstruction has gradually changed from a nearly complete rejection to possible acceptance if carried out according to established guidelines. Indeed, in the World Heritage List there are several rebuilt properties, which have been accepted even as part of the justification, such as Warsaw city centre. At the same time, there are cases where rebuilding has been rejected, such as the Bagrati Cathedral in Georgia. Such inconsistencies may often depend on the misinterpretation of the sources of information on which the recognition of something as heritage. It now goes without saying that the ritual, periodical reconstruction (recreation) of the Ise Shrine will be even internationally

acceptable as part of a living religious tradition. In such case, the focus is in the continuity of the tradition rather than the historicity of the material.

Recognition and conservation of something as heritage is a cultural problem. Wooden structures can be seen to represent creative cultural expressions resulting from a creative process in the human thought and resultant construction. This process can be sustained by living traditional continuity,

which itself has a creative component, but which can also have discontinued leading to ruins and architectural remains. In a creative process, significance and meaning are associated to material resulting in architecture, which can be broadly understood as a representation and an integral part of the built environment, or cultural landscape. Architecture consists of two components: one is the functional scheme on which the creative process is based; this founds an expression in the social-functional integrity of the place. The second aspect consists of the material that is used in the construction, and which represents its historical-structural integrity and material authenticity. The recognition of architecture as heritage takes into account its artistic/aesthetic as well as its historical aspects within the relevant physical and cultural context. The conservation theory regarding architecture concerns also wooden structures. The conservation process starts by the recognition of such structures as creative cultural expressions and as heritage. The conservation policy and associated treatments will depend on this recognition.

II. Keynote Speech

The Nara Document and the Conservation of Wooden Structures in Japan

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◆ Background to the Nara Document

This international conference is designed to serve as a forum for discussing the status of cultural heritage conservation after the drafting of the Nara Document on Authenticity in 1994.

The Nara Document has been accepted as something quite epoch-making in the cultural heritage conservation field. We may say that it has served as a foundation for the principles and practices of cultural heritage protection in subsequent years, particularly the protection of cultural heritage under the Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention).

The Nara Document was drafted only a couple of years after Japan's ratification of the Convention (in 1992) and shortly after UNESCO's first listing of wooden buildings (in December 1993), such as those at Horyu-ji Temple and Himeji-jo Castle, as the World Heritage.

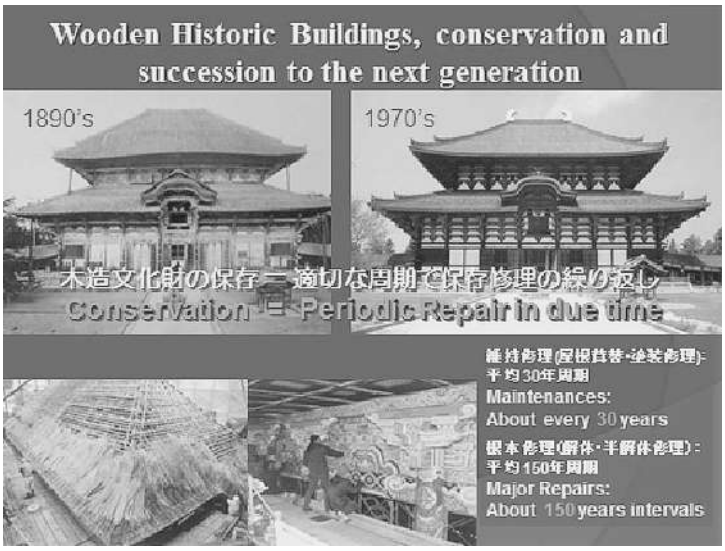
Old wooden structures in Japan extant today have been repaired and modified a number of times during their long histories. Their conservation has required the replacement of impaired structural components. Since modern times, the dismantlement of structures during repair works and the modification of building by restoring to its earlier forms with the intent to conserve them as cultural properties have also become common practices. As we tried to conserve our cultural heritage in a manner consistent with international practices, it was important to find out whether or not such cultural properties in Japan (wooden structures in particular) and the methodology they had been conserved were acceptable from the viewpoint of legitimacy in the transmission of history to the humanity of today; that is to say, whether or not they could pass the test of authenticity that was obligatorily required before the listing of any property under the World Heritage Convention. This was not a concern unique to Japan. Since countries in the Asia-Pacific region have many cultural properties of a similar kind, other countries in the region faced the same challenge.

Concurrently, international initiatives for cultural heritage conservation met broader challenges. As people began to take note of new types of diverse cultural heritage in different parts of the world, UNESCO and heritage conservation specialists in charge of the conservation of World Heritage and other cultural heritage properties became strongly aware that the conservation of such heritage would require something more than the existing principles and methods of cultural heritage conservation (prescribed by the Charter of Venice) that mainly addressed more permanent structures such as monumental constructions and their ruins in the West, which so far had been the main focus of conservation efforts. Twenty years after the establishment of the World Heritage Convention, they began to look for a new framework to be able to

address such expansion of the scope and definition of heritage and the growing geographical and cultural diversity of the places to which heritage belonged.

◆ **Intent of the Nara Document**

In the Nara Document, it is stated that it was, "conceived in the spirit of the Charter of Venice, 1964, and builds on it and extends it."



As a platform for attaining a new vision, it requires respect for cultural diversity and cultural heritage diversity. We may say that the Nara Document represents an attempt to come nearer to UNESCO's ideal with a step toward the next stage taken by the bringing relativism to discussions concerning cultural heritage and its conservation.

Regarding the authenticity of heritage as an essential qualifying factor in cultural heritage conservation, that is to say, the credibility and truthfulness of the information transmitted by the heritage, the Nara Document, based on the above-mentioned standpoint, says that it should be examined and assessed carefully in consideration of the diversity of cultural heritage and of the cultural contexts to which it belongs.

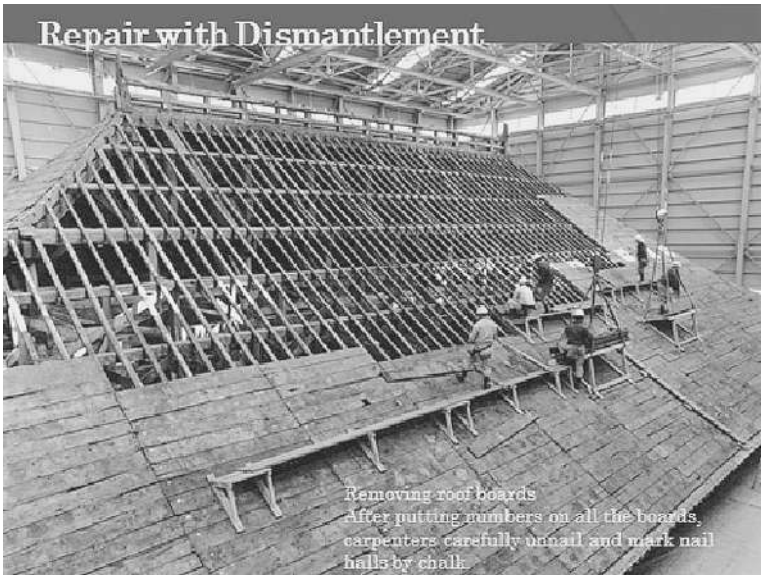
During the Nara Conference of 1994, Professor Françoise Choay of the Université de Paris, discussed the historical evolution of the concept of authenticity and pointed out that, in modern times, authenticity had become a point of concern in the discussion of cultural heritage from an ontological viewpoint.

The examination of authenticity is required for each of the different components comprising cultural heritage. Discussions during the Nara Conference helped to spread awareness that the assessment of authenticity, which had remained partial in the past, should be expanded to cover the great diversity of internal and external components attributed to cultural heritage.

◆ **Conservation of wooden structures in Japan after the drafting of the Nara Document**

At the time when the Nara Document was drafted, Japan was beginning efforts to seek consistency with the Western standard of cultural heritage conservation.

Due to concerns regarding the principle of trying to preserve the authenticity of cultural heritage, people were alerted to the possibility of authenticity being spoilt by certain practices commonly followed in Japan when repairing wooden structures such as dismantlement of structures; replacing structural components damaged by deterioration, etc.; and restoring to earlier forms. Addressing this point, Japanese participants of the Nara Conference explained in detail and gave specific examples on efforts being made to maximize the reuse of extant structural components during the repair of wooden structures. Participants also



explained how the dismantlement of structures is required in some cases to be able to properly conserve wooden structures and that earlier forms of structures are restored accurately based on the results of careful investigations and research; and also that detailed records are compiled in the course of conservation activities. They explained how Japan has been making effort to conserve its cultural heritage adhering to principles similar to internationally accepted basic principles of heritage conservation such as retaining of authenticity. These explanations gained support to a certain degree from overseas specialists.

The Nara Document focuses significantly on the diversity of cultural heritage and of the cultural contexts to which it belongs. This, in part, should have been in acknowledgement of the principles and systems that had developed uniquely in Japan in the field of wooden structures conservation and repairs.

There are no major differences before and after the drafting of the Nara Document in the way the conservation and repair of wooden structures are planned and implemented in Japan. However, we would like to acknowledge that great changes have happened in the minds of experts and researchers working in the field of heritage conservation. We find that they have become even more careful than before when formulating the policies of repair and restoration projects and when deciding the methods to be used for repairing structures or about the scope of structural component replacement.

On the other hand, the background of the conservation of wooden structures in Japan has changed greatly in the twenty-year period since the drafting of the Nara Document.

After the Great Hanshin-Awaji Earthquake of January 1994, demands were made to seek higher standards in the implementation of seismic protection measures for cultural property structures. It was necessary to implement comprehensive measures that included not only technical measures but also other measures such as improvements in the way buildings are used and managed. Even higher demands on seismic protection measures for cultural property structures were made after subsequent earthquakes, including the Great East Japan Earthquake of March 2011.

Moreover, the 1996 amendment of the Law for the Protection of Cultural Properties introduced a

registration system that allowed a wide variety of cultural property structures in different parts of Japan to be protected under a loose regulatory framework. Furthermore, the number of historic districts and the number of buildings from the modern period requiring conservation have been increasing rapidly. We are witnessing a rapid increase in the diversity of wooden structures and groups of wooden structures requiring conservation. Besides the masterpieces of wooden structures, such as those registered as important cultural properties, we now have many others that require conservation based on a different set of values.

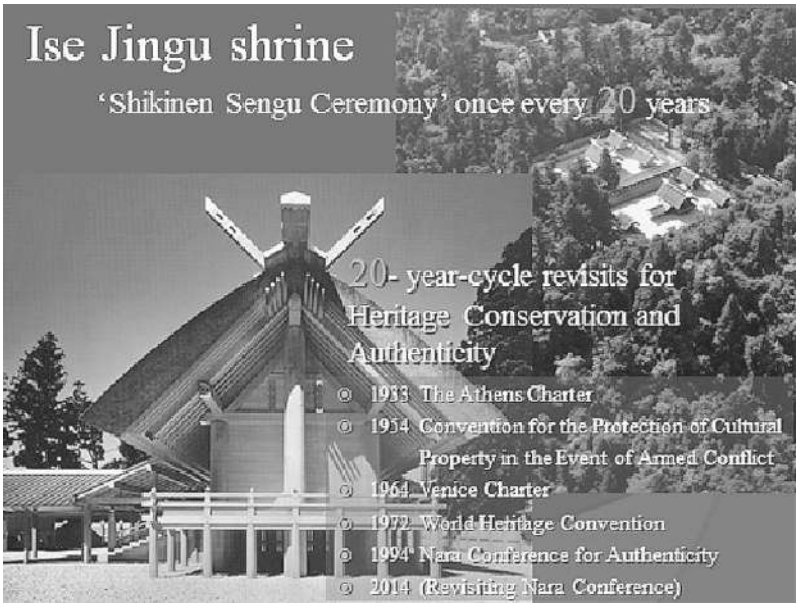
Addressing such a situation, new efforts have been started to seek progress in the conservation of wooden structures and the retaining of their authenticity. In different parts of Japan, efforts are being made to train repair specialists and technicians. In addition, new efforts have been started to secure traditional materials required for repairs. Furthermore, new projects aiming to conserve historic buildings together with the surrounding environment have been started, even though the efforts made in this area still appear to be insufficient. Larger involvement community in preserving historic buildings has also become prevalent.

◆ **Toward the next twenty years**

The Nara Document was carefully composed.

It demands respect for the diversity of cultural heritage and the cultural community to which it belongs, and asks us to make judgments in consideration of this diversity. On the other hand, it says that the responsibility for the conservation and management of cultural heritage should be fulfilled by the cultural community to which it belongs.

In Japan, the situation around the conservation of wooden structures has changed greatly over the last twenty years. In the light of the new situation, what are the principles that should guide us in the examination of authenticity as an essential qualification factor supporting the values of various cultural heritages? What are the specific measures that should be employed? We now have to think about these questions. We may say that it is our duty.



Protecting Authenticity and Value in Restoring Wooden Structures Using both Traditional and Extra-Traditional Method

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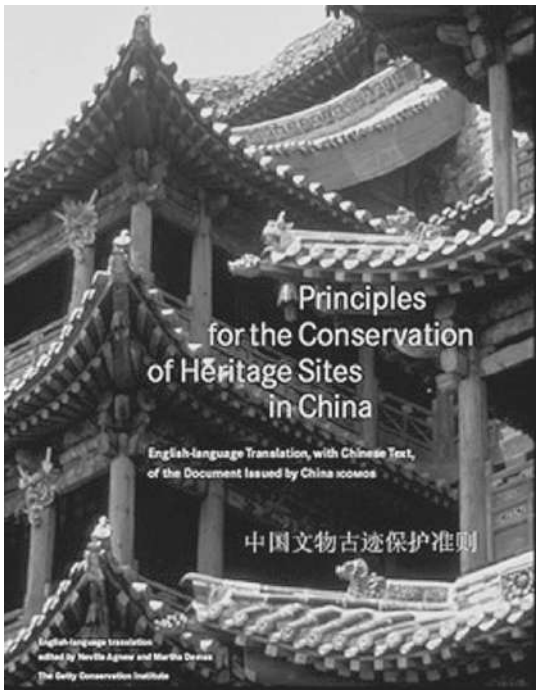
It is my honor to have this opportunity to be present at this conference and to discuss with my colleagues of East Asia.

In the last two decades the world heritage conservation movement has developed so fast and so profoundly that it has involved the whole of East Asia. Its theoretical achievements were reflected in its series of international documents which always were connected with abundant cross-cultural conservation practice. The consideration of cultural distinction always existed in its documents forming process- which, for most of the last century came first from different cultures within Europe, then from different cultures of the rest of the world. Since *The Nara Document* edited by ICOMOS, appeared in Japan in 1994, the oriental cultural distinction has been recognized.

In 1999 China completed her historic theoretical summary of heritage conservation based on 60 years practice, absorbed greatly from international experience – such as the *Burra Charter* edited by Australian ICOMOS, and formed the *Principles for the Conservation of Heritage Sites in China.* From then on, the steps toward nomination for world heritage in China were accelerated, and *Operational Guidelines for Implementation of the World Heritage Convention* was roundly introduced into China. The principles in *Guidelines* were put into use in the projects' administration. This improved the Chinese conservation movement quality especially in protecting the authenticity of China's heritage.



But the Chinese practice, which is so different from Europe, North America and Australia, stimulated ongoing debates and discussion about authenticity – some reflected in the *Qufu Declaration* (2005) and in regard to the *Beijing Document* (2007) being joined in discussion by international experts. From their discussions, not only did

Chinese experts gain more understanding of universal principles but also, the western experts learnt more about the oriental 'way and why' of preserving China's wooden structures.

I would like now to examine some cases, and discuss 'authenticity' in the Chinese context even though there are other practical issues to consider as well.

Oriental wooden structures' traditional and extra-traditional restoration methods:
This century, China's conservation project has changed greatly influenced by the principle of minimal intervention (originally reversibility) and the principle of 'distinguishable.' Its wooden structural system – the basis of China's cultural distinction and integral to Chinese culture – and the main stream of East Asian traditional building, which is continuously under restoration, its particular restoration methods influencing all countries of East Asia − even buildings in the area of masonry construction.


Wu family's shrine in Shanghai

This first case is a local heritage in an urban area of Shanghai, a shrine of the Wu family, built in the 1930's and restored in 2002. The tenon of one beam in the side hall was rotten and decayed, so in order to maintain the wood carving on the beam, we did not require that the beam be replaced by a new one – as would have been traditionally done, but instead, used a steel element to reinforce the joint and put the beam back.

This next case is a provincial heritage in Wuxi, Jiangsu province, an old home of a famous musician of the 1950's, who lived 'poor' but whose music surprised all of China after his death. In discussing the restoration proposal, experts evaluated the heritage and felt that the poor wall of the house, which consisted of broken bricks and earth, was part of the value of the heritage because it helped people understand why the musician could create such exciting music. Therefore, we could not use the traditional method-to demolish and rebuild it. And, the wall was weak and dangerous and a threat to visitors. So, in order to reinforce it as the code required, we imported an Italian technique to reinforce the whole wall, and maintain the 'poor' appearance of the house at great cost. Both of these cases used new materials or techniques which were unknown in tradition - this way of restoring was an extra−traditional method.


Musician A Bing's old house in Wuxi, Jiangsu province

Another way of restoring is the traditional method − the one which is still used in most parts of China because it is easy for traditional craftsmen to construct and in most cases costs less. According to the *Qufu*

Declaration, restoration was to follow four 'original things': *original construction pattern, original material, original approach and original technique.* These are much debated.

Both methods have benefited the conservation movement. The methods are not interchangeable. Each is important and has its advantages. To follow the traditional method today has become exceedingly difficult now that traditional materials and techniques have virtually disappeared and knowledge of traditional construction has vanished from our construction teams and our education system. Administrators increasingly emphasize the extra-traditional method – liking the proposal/discussion/approval process.

Analysis of authenticity − comparative views:
The practicality of achieving authenticity in conservation projects is quite complicated. For protecting authenticity both methods are necessary, not only in China but also in Europe. Restoration, while aiming for authenticity, is produced not literally by principles of the past but by value assessment, and by analysis of issues, including technical conditions.

Here is a case in Europe − the Basilica Vicenza**,** a world heritage in Italy, the main parts of which were designed by Adrea Palladio (1508-1580), a famous Italian architect. It is a two story building with wooden arched trusses supporting the roof. It was destroyed in world war two, but restored in 1946 according to a restoration proposal selected by design competition. The upper part of the wooden truss was replaced by reinforced concrete with a wooden surface, and another reinforced beam was inlaid to the brick wall horizontally and connected to the truss edge.

Sixty years later, leaks appeared at the brick wall where the beam was located. So, another restoration competition was held, and was won by a team of experts having various disciplines – to be led by Wassalo, a professor of Venetian polytechnic university.

By examining and evaluating the leaks at the brick wall, and also the concrete part of the trusses, Wassalo decided to demolish the concrete beam in order to release some stress, and to replace the concrete in the trusses with wood. But he maintained the incline degree of the trusses in order to reuse all of the roof boards, and used new light weight concrete to replace the old above the arched structure of the first floor. Doing so meant that he did not retain the historic information of the concrete elements, did not keep this kind of 'authenticity,' but he maintained the wooden boards and reconstructed some parts of the original wooden structure.

According to my analysis the methods he used were in some places: the traditional, in others: the extra-traditional (where new materials were used).

The aim of restoring is clearly to maintain, in safe condition, as much as possible, the 'authenticity' of the project (pictures).

Gan family houses before restoration –holding more than thirty families but none of them had owners. Most of the houses were at risk.

Another case is the Gan family's residential complex in Nanjing − a national heritage of China. Its original function was residential but now it is a local-custom museum, showing the life style of old Nanjing. Since some parts of the structure did not meet contemporary safety codes restoration was involved. Some elements could be replaced – as where new purlins of larger cross-section replaced existing ones. But where there were carvings on some wooden beams we had to maintain the original parts of the beams to keep the historic information for authenticity's sake. Perhaps we might have used carbon fiber material as in some other projects, but here we couldn't because there was carving on the beam ends.

Wooden elements gradually losing strength was an issue faced by ancient builders and sometimes dealt with as in this building. Here, elements were added to support original parts as seen in the incline supporter and the small part of the beam end (pictures). Similar elements appeared below the beam and purlins (pictures).

This is Guanyin tower, a national heritage in Hebei province built in Liao dynasty, 12^{tth} century (picture 9). The structure survived intact for several centuries until, in the 17th century, its roof eaves sagged. The craftsman then added posts to support eaves at each corner which, by contemporary standards, were extra elements, having not existed originally. But factually, in the long history of Chinese construction, these were a kind of post which had been used to support the eave since the 15th century.

In this ancient case the part added to the 'original' structure was inseparable from the structure itself, and thus, belonged to the traditional building system – being part of the intangible heritage of the Chinese

construction system – definitely not an addition of some new material or technique as it would be the occasion of using the extra-traditional method (pictures).

Today the traditional method is seldom accepted at the proposal stage because it implies change to the existing situation, and thus the destruction of 'authenticity' – although both methods have benefited countries throughout the world – and the conservation movement. In reality, expediting the engineering of the restoration methods is rather more complicated than the principles might portend.

The spirit of the Nara Document, emphasizing the connection between authenticity and culture, was absorbed by the *Operational Guidelines for the Implementation of the World Heritage Convention,* newly printed after 2011, which stated: *"Judgments about attributed cultural heritage, as well the credibility of related information sources, may differ from culture to culture, and even within the same culture. The respect due to all cultures requires that cultural heritage must be considered and judged primarily within the cultural contexts to which it belongs."*

Attributes such as spirit and feeling *do not lend themselves easily to practical applications of the conditions of authenticity, but nevertheless* are important indicators of character and sense of place*, for example, in communities maintaining tradition and cultural continuity.*"

The contexts of Chinese culture need further analysis to support its continuity.

Assessing Chinese cultural influence in considering 'authenticity':
It is true, that without cultural contexture 'authenticity' would be only a tree without roots, which without the foundation of cultural diversity universal values would be just a pond without a spring.

West and East today, have similar cognition about heritage conservation and about the cultural diversity of the world. The universal values and the principles of the international documents have integrated opinions from diverse cultures. But there still exists dissimilar understanding about authenticity. It is not enough to learn from international experience – we have to embrace our own tradition, to understand our cultural roots – and to appreciate the subtle distinctions among them.

Western architecture was a part of European culture rooted in ancient Greek and Christian cultures whose attributes are arts and aesthetics. The East had no such process. In China it is the house – 'house is a pivot of yin and yang, a guide track for human ethics and relationships.' Construction knowledge was arranged in two parts, one: standards and metaphysics – recorded the ceremonial system, the other: operations – recorded and transmitted by craftsman generation to generation.

In the 20th century, Chinese followed the Japanese translation for the new concept: 'architecture' using two Chinese characters "建筑." When the famous academic organization – the Society of Chinese Architecture (its Chinese name **营造学社**) in 1929 still used **营造**（Ying zao） (construction) rather than 建筑（architecture）the director Zhu Qi qian (朱**启钤**) explained that construction (**营造**) was a practical activity with cultural meaning, and was related to many other technical things – not a pure art.

China was radically affected by the fifteen hundred years of Western culture imported into the country. The knowledge and educational systems were built to Western standards, and the technical and artistic aspects of architectural heritage, and their preservation, were often ignored though their social role was not forgotten. Chinese today tend to regard ‘architecture’ as something similar to a dressing - to show one’s status. In the social psyche the term “建筑” (architecture) is still the activity of ‘housing’.

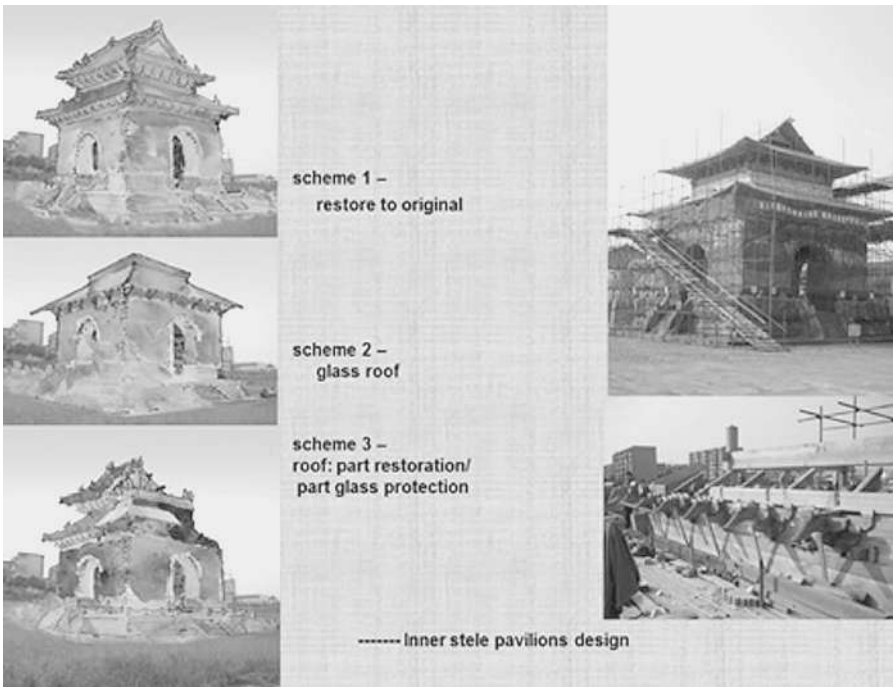
The Chinese classical knowledge system did not form scientific disciplines to the degree of those in Europe. The intangible – especially the ideological part of the heritage – was emphasized rather than the tangible and material part as in the tradition of separating metaphysics and operations, believing the intangible part to be more eternal than the tangible, such as the wooden buildings. The framework of the Chinese knowledge system was formed by the fundamental view of the cosmos stated in Yi Chin (易经) influenced Confucianism and Daoism – the basic idea being that all things in a boundless universe share a similar structure. This also informed the Chinese way of thinking - integrating style, and emphasizing intuition.

Chinese respect for their ancestors and the traditional system is behind their maintenance of so many heritage properties, but the Philosophy of Yi jing is a philosophy of social life.

In Chinese history, even in emperors’ ancestral temples the ancestors’ names for five generations past were to be moved out of the main hall – except for the first one – the founder.

To maintain late generations living better is an essential aim of Chinese culture.

Chinese popular people don’t like maintain ancestors time as a frozen form in museum, tradition should be a historic river flowing down from ancient time up to now and to future. They enjoin emotion and imagine that the highest standard of beauty is a beauty of an environment which stimulates your poetic sense and mood.



Analysis of Chinese culture and the reality of the conservation movement reveal that ‘authenticity’ in China has attributes rather different from that in the Optional Guidelines.

In order of importance – generally they are:
1) construction pattern
2) use and function
3) location and spirit of site

4) material and substance
5) their relation with tradition and so on.

Of course the real sequence depends on case study.

Conclusion:
To Chinese, protecting the authenticity of cultural heritage is still the serious issue – its most dangerous threat – destructive construction and excessive restoration.
As the Operational Guidelines state, it is not easy to realize the attributes of authenticity in practice, but we must do so because they would help us to think and to solve issues in conservation practice. Scholars should research these attributes and use them to analyse the practical issues.

My ultimate conclusion is to urge that in order to protect the authenticity of wooden structures both traditional and extra-traditional methods be used.

III. Paper by Participant

Disputes and Debates: Approaches to the Repair of the Wooden Pagoda of Yingxian County

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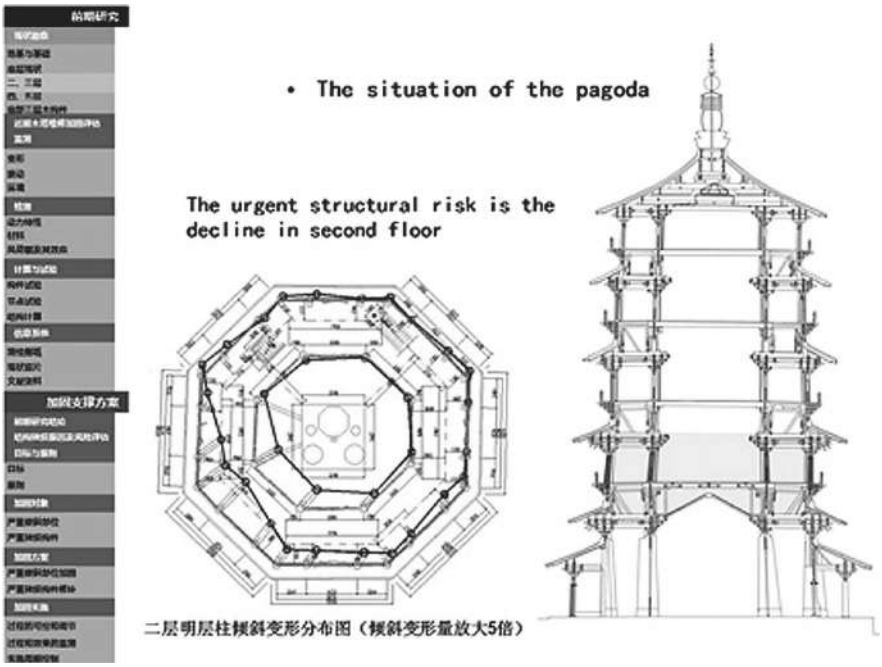
China Academy of Cultural Heritage

I. Introduction

In the middle of the 11th century, the Liao Emperor was able to build Buddhist temples throughout its vast territory. In 1049, the White Pagoda of Qingzhou was built to bury Buddha's relics. Two other famous temples were being built in China's neighboring countries in the same historical period, which are Buphuon Temple (1500 – 1660) in Angkor of the Khmer Dynasty and Hinduism and Byodo-in-ho-o-do Temple (1053) in Kyoto of Japan.

In 1056, the Emperor of the Liao Dynasty ordered the construction of a Buddhist pagoda in Yinzhou in the northern part of the present-day Shanxi Province. Having cost enormous manpower and plenty of trees nearby, a huge temple was completed, among which the most famous structure is the 64.8m-high wooden Sakyamuni Pagoda (later widely known as the Wooden Pagoda of Yingxian County).

Countless high-rise wooden structures had been built prior to the Liao Dynasty, from the Han Dynasty through the Tang Dynasty, some of which were even higher than the Wooden Pagoda of Yingxian County. But none of them have ever survived until today. The Yingxian Pagoda is an exception which still stands firm today after almost one thousand years. The Yingxian Pagoda is the highest, largest, oldest and most spectacular historic wooden structure of its kind currently existing in China.



However, among all exist historic wooden structures in China, it is the one facing the greatest safety risk, suffering almost all kinds of hazard, such as sloping, displacement, components damaging and building materials weathering.

The Wooden Pagoda's current state has remained the focus of academic debates over years. Some

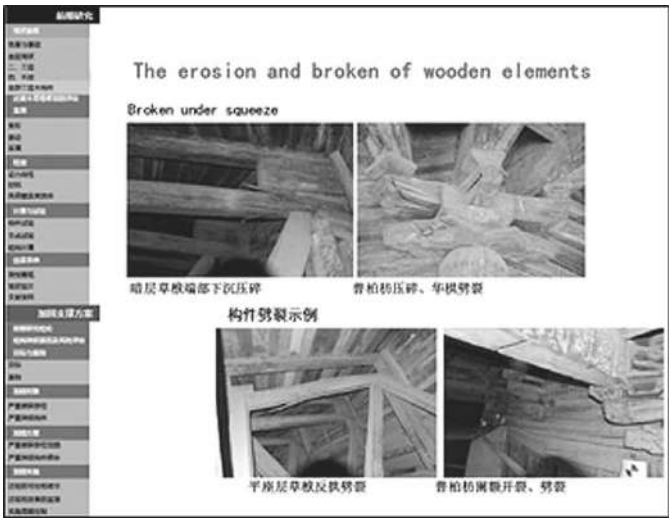
experts hold that the pagoda has been sloped and damaged to an extent that it may go collapsed when hit by strong wind or earthquake. But others argue that the pagoda is free from major risks and can remain safe for at least one hundred years.

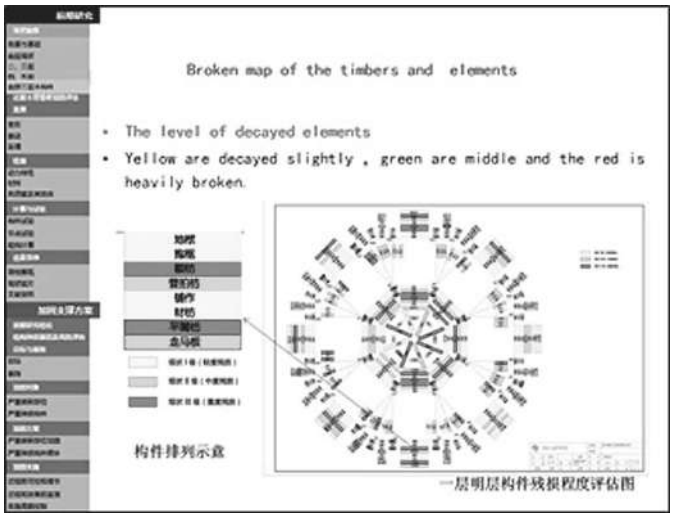
Over the past decades, the repair of and study about the Wooden Pagoda of Yingxian County have drawn extensive attention from both the government and the society and unremitting efforts have been made in repairing and restoring this valuable historic monument. Renowned academicians, professors, researchers, engineers and specialists have put forward various pioneering protection and restoration proposals, based on their academic and professional background and their own understanding of protection philosophies and principles. Ever since the 1970s, these experts and scholars have made heated discussions and debates over approaches to the protection of the Wooden Pagoda of Yingxian County and on some occasions they even set up a claim of their opinion by voting. We can hardly find another historic building which has been given so intensive attention as the Yingxian Pagoda. And the Emperor might not predict that he left over such a difficult problem to Chinese conservators today.

II. Figures and Facts about the Wooden Pagoda

Exploration about ways to protect the Wooden Pagoda of Yingxian County began in modern China. When modern Chinese scholars found this pagoda with spectacular shape and typical structure, they soon began to worry about its safety and consider how to restore it.

Conservation experts have reached a consensus that the Wooden Pagoda of Yingxian County needs repair, because it suffers potential risks after nearly one thousand years of tear and wear. The pagoda is built in a Buddhist temple, featuring the typical style of wooden structures of the Tang and Song dynasties. Each layer of peripheral columns, beams and brackets are overlaid and reshuffled within this wooden structure. The pagoda consists of nine layers of circular columns (the ground floor is propped by sandwich walls), eight floors of beams and brackets, and one roof layer supported by a beam frame. Looking from outside, it takes the shape of five clear floors, plus four hidden-floors as the structural layer. Each floor is composed of two circles of columns. The internal peripheral columns form a space which should be much higher, for it is used to enshrine Buddhist statues. The external space surrounded by columns is mainly used for human activity and could be lower. Thus, the beam and bracket layers in the internal space are removed to form a hollow barrel-shaped space. All these layer structures are made of wooden components, including wooden beams, columns, brackets\skeletons and roofs, and only the roof is covered with tiles.





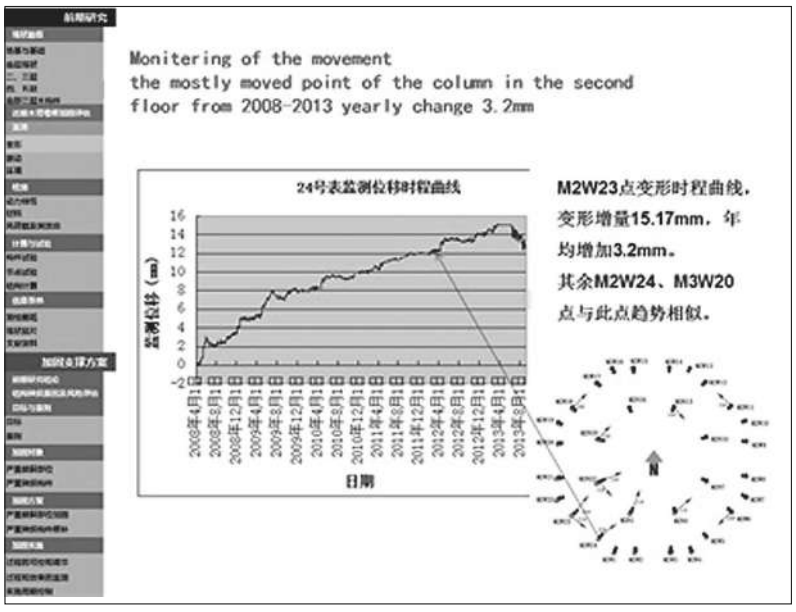
Structures among wooden parts were made with formal building techniques of the Liao Dynasty and its plane modulus and measuring system drew upon from mature practices of wooden buildings from the Han and Tang dynasties. Therefore, this exemplar building crystallizes the craftsmanship of ancient China and has withstood the test of history. In fact, over the past nine hundred years or so since its construction, the wooden pagoda has survived scores of major earthquakes and many other external attacks, demonstrating its uniqueness as a wooden structure.

But regrettably, no written records about the pagoda's designing, construction and techniques, either by the government or by local records, have ever been left and as a result, we know nothing about how it was built or maintained. Wooden structures of this kind unavoidably have their weakness, such as limited quality of wooden materials, inefficacy of tenon-and-mortise work on nodes, and inevitable risks deriving from its structure system. That is why it underwent several major repairs and reinforcements after completion.

The several major repairs and reinforcements in history have been recorded. 150 years after its completion, artisans of the Jin Dynasty made comprehensive restoration, instead of rebuilding it. That repair and consolidation was quite thorough, for artisans might know that this high-rise wooden structure would suffer serious hazards 100 year later. The auxiliary columns attach main ones and inclined supports between the internal and external peripheral columns in the hidden stories were strengthening in Jin Dynasty, the pagoda underwent a major repair every 120 to 150 years. The last one was carried out in the 1920s and 30s.

Historical records about repair and restoration mainly include praises of merits and virtues and have little mention of repair techniques and practices. As a result, we know little about each repair practice and state thereafter.

Scientific records about the pagoda, however, most of these records are descriptions of and comments on the pagoda's architectural accomplishments as a unique historic wooden building of China and even the East; only few words are about its protection. It may be because at that time, people did not realize there were risks existing in the pagoda at all, or even if there were some, experts believed that they were far from serious.



The pagoda's major safety risks had not been discovered until the 1980s when several on-the-spot surveys were carried out. These surveys reveal that the pagoda's pillars in the southwest parts of the second and third floors slope to a quite serious extent. The sloped pillars, in addition to cracked or curved components, were triggered out as a people's great concern about its safety. In 1976, the Chinese Institute of

Cultural Relics (predecessor of China Academy of Cultural Heritage) sent experts to consolidate the pagoda, the first of its kind in a modern sense. A triangle support was placed inside the two most seriously damaged main pillars in the internal column circle on the second floor, in an attempt to resist the inward sloping of the wooden pillars. Generally, this consolidation practice should be recognized, though there were negative evaluations on the result of approach.
Since then, the protection, repair and consolidation have been put into the government's agenda. Engineering institutions and research institutes specialized in cultural property protection have begun their attempts to design approaches and principles for the pagoda's protection and repair.

III. Debates about Restoration Approaches

As for the heavily deformed pillars leaning northeastward on the second floor, problems cannot be solved unless they are all dismantled. It was probably the earliest proposal for the thorough restoration of the wooden pagoda. But repair by disassembling was not realistic at that time, because it needs huge budget that it's even difficult in that time. In the following several decades, people adopted the idea that "Though the pagoda suffers over 200 hazards, in particular, slight sloping and twisting on its second and third floors, it is basically in a safe state."

As time goes by, the Wooden Pagoda suffers ever-growing hazards and gains ever-increasing concern about its state of existence. In particular, the major earthquake of Tangshan in 1976 has called for questioning about the pagoda's longstanding existence. In the middle of the 1990s, organized by the State Administration of Cultural Heritage of China (SACH), efforts to repair and restore this historic pagoda were launched. The Office for the Restoration of the Wooden Pagoda of Yingxian County was established, consisting of officials and professionals from the central, provincial, municipal and county levels. The office's main responsibility is to make preparations for the repairmen of the pagoda.

But it was not successful to work out a satisfied project accepted by all parties. From the very beginning, various viewpoints have been raised, such as "repair by keeping the current state", "repair by dismantle structures," "repair by supporting and reinforcing structures" and "restoration by uplifting the upper part while overhauling the lower part." In this presentation, I would like to give a brief introduction to several major viewpoints concerning the pagoda's repair.

i. Repair by dismantle and restore structures

Repair by dismantling historic wooden structures and reconstruct it again is a conventional approach in China. This approach is based on the knowledge and understanding about characteristics of wooden structures of ancient China. As they are primarily wooden structures constructed with tenon-and-mortise work, they could be dismantled and re-assembled. This approach has been widely used in repair historic buildings in China. For example, over ten extremely valuable historic buildings of wooden structure in Shanxi Province, including the famous tower feiyunlou (fly cloudy

tower) which underwent repair recently, were all restored by using this approach. Representative scholars supporting the approach of "restoration by dismantle structures" include several senior and pilot conservators.

All these experts have rich experience in the repair of historic buildings, in-depth understanding of traditional techniques in building wooden structures, and strong practical ability for repair work.

By this repair approach, all building components are dismantled and then restored. Usually, historic buildings using this repair approach are seriously damaged, suffering load imbalance, column deflection, broken brackets or inclined beams. The Wooden Pagoda of Yingxian County meets all these criteria and thus some experts hold that it should undergo a comprehensive overhaul by dismantlement.

Dismantlement is a traditional approach. No detailed plans need to be drawn up, because many plans, drawings and standards used over the past dynasties can be referred to as suitable blueprints. Further improvements and detailed technical plans, such as how to strengthening components, can be made according to actual conditions occurring upon being dismantled. Currently, disassembling is just an option based on traditional practice; no concrete plans or drawings have ever been worked out.

We can imagine this restoration process. First, the pagoda's structures are dismantled. Then, repaired and restored components are re-assembled so that inclined parts are restored to their right positions and deformed column ends, architraves and brackets are replaced with new ones. Thus, a restored and revitalized wooden pagoda will come to life.

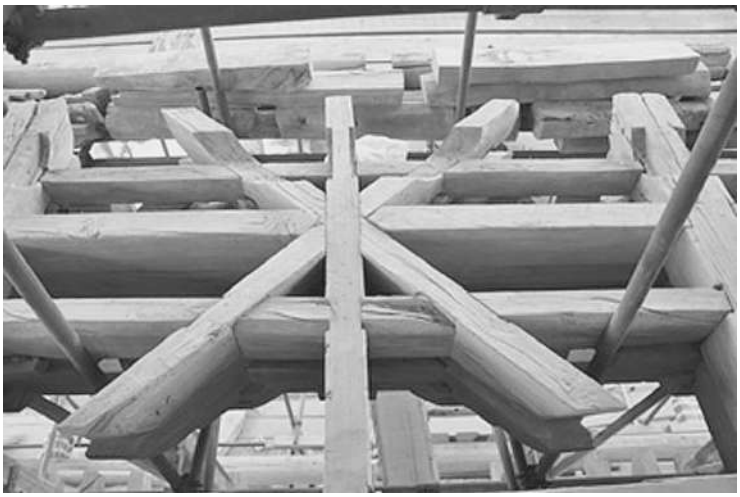
However, some uncertainties do exist in restoration concepts and techniques, concerning the "restoration by dismantle structures" approach.

First, we must ask ourselves if we are able to accept the painful process of a magnificent historic building being totally dismantled and then rebuilt. It is not an ordinary historic temple or worship halls, but a 60m-high, 1000-year-old architectural masterpiece in which each wooden component is covered with clay statues, colored paintings and murals.

Absolutely, we cannot give an answer that justifies our true mind. Standing under the huge shadow of the Wooden Pagoda of Yingxian County, we can imagine the scene that in ancient times, the pagoda temple's bell strikes echoed in the quiet and vast field and farmer dwellings with earthen walls and flat roofs around the temple are just like subordinates creeping at the

foot of the holy temple halls. After one thousand years, the wooden pagoda looks no longer magnificent and dignified; its structure is leaning and its roof is sinking. But this historical appearance, though not so spectacular, deserves our greater admiration.

Ascending the wooden pagoda and walking through the wooden-structured floors, one cannot help generating a historical feeling. Cracking of wooden components are astonishing. Main columns and beams are remarkably deformed. The inclined structures and ground make you feel that a supernatural power is functioning. The deformed pagoda best demonstrates how this wooden structure is under stress. The deformed structures record the pagoda's process of existence and evolution over the history in an authentic and detailed manner, which any laboratory simulation cannot replace.



These historical traces accompany the pagoda for more than 1000 years, serving as the witness of human civilization and wisdom and the everlasting sample crystallizing scientific and technological progress. How can we destroy it only because no consensus has yet to be reached?

Besides uncertainties in concept and principle, the "restoration by disassembling structures" approach cannot guarantee that no error will occur in the restoration practice from a technical perspective.

There are several difficulties to address if the pagoda undergoes restoration by dismantle structures. First, this approach will be involved with the replacement of old components. According to general practices using the "restoration by disassembling structures" approach, heavily damaged components that cannot function normally should be all replaced. But quite a number of beam timbers, brackets and columns on the second and third floors cannot function normally. Should all of them be replaced? What are the criteria for the replacement? It seems that no one can give a satisfying answer. Furthermore, what are the criteria for making new components? If original materials continue to be used, they will have the same problems as the existing ones. But if new components are strengthening, such as consolidate cross grains, can the authenticity of this traditional wooden-structure building be guaranteed?

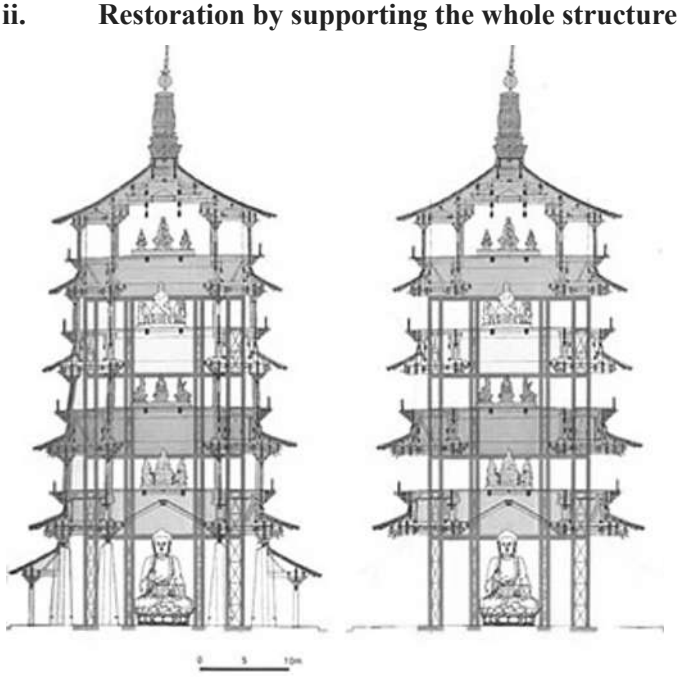
Second, there is difficulty in correcting deformed components and structures. After hundreds of years of hard loading, many of the pagoda's wooden structures have changed from elastic deformed

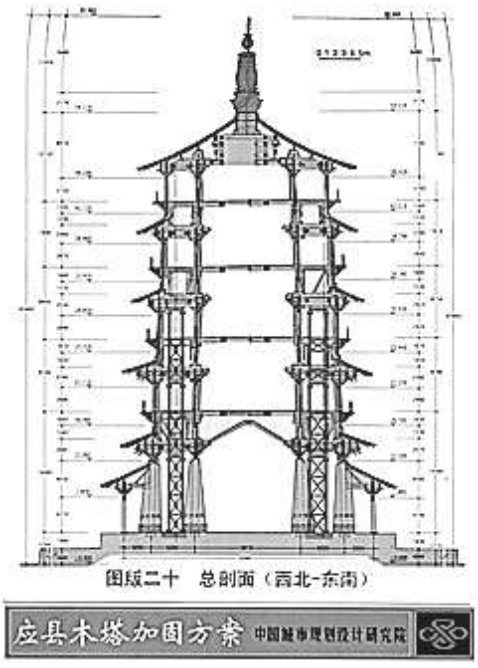
parts to crept parts. There is no way to restore crept parts to their original states. Moreover, interconnected components and structure points have already adapted themselves to each other; or in another words, they are adaptable to the state of deformation. Under this circumstance, can they fit for new component sizes and new distribution of structure points? For a structure which has already been adapted to a new state of balance, partial correction will lead to new distribution of internal force. Do we need such correction? If we do need, to which degree we will make correction?

Third, over past centuries, the Wooden Pagoda has undergone restoration and rebuilding many times. Many supportive interventions are temporary and some were even added at liberty, such as auxiliary pillars added in the later period, oblique supports in the hidden stories, etc. Many of past research works gave highly positive comments on supportive interventions, insisting that oblique supports in the hidden stories are something like modern truss and thus the key guaranteeing the stability of the pagoda. These positive comments make sense but are obviously overstated. In fact, many supportive frames in the hidden stories look scientific but have deficiencies. Only structural restoration in the real sense can fundamentally remove potential risks caused by deformation. Components added later are either unnecessary or unable to restore deformed or inclined parts to their original position and state. If there is no need to eliminate deformation, why do we have to dismantle structures?

Structural problems are much more than these ones, many of which are out of our prediction. Therefore, from the conceptual and technical perspectives, dismantle and restore is not the best choice for the pagoda's repair, at least not now.

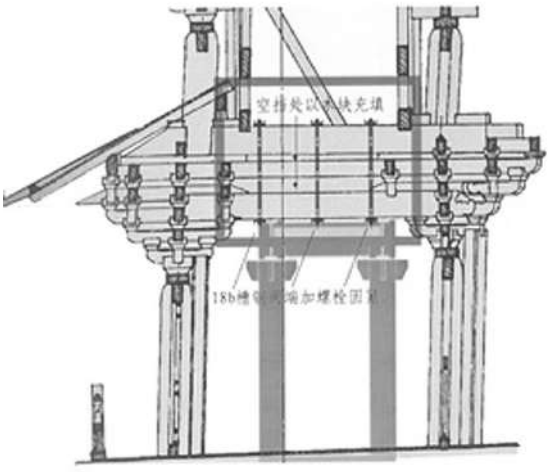
ii. Restoration by supporting the whole structure





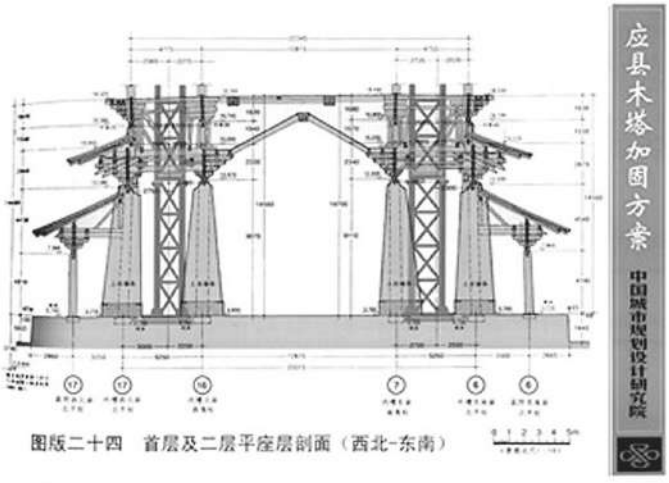
If we want to preserve all historical traces of the Wooden Pagoda, including all its structures, components and materials from the beginning of construction until now; if we look at it as an irreplaceable historical sample, a habitat for a past soul to walk through and seek the road of return, and a holy hall dwelled by deities, our actions should be as possibly gentle as we can in order not to disturb them. Do we have any other choice if the restoration by dismantle structures will pull off these historical traces?

A unique idea of conservation approach known as the "repair by supporting the whole structure" was work out by scholars. According to this concept, a three-story high steel framework will be placed between the inner and outer peripheral column circles. The framework's supporting scope can reach all parts of the lower three stories with damaged structures and components. The designer's intention is to use this new supporting structure to bear the load from the upper parts which are originally placed on the fragile and damaged lower parts. This steel framework can strongly support beams, stabilize pillars and hold brackets, and is capable of resisting all stress attacks from the outside. It is like the Transformers in Hollywood movies which can reach out numerous arms and adjust the strength of arms according to various mechanic indexes. We should admit that it would be a highly creative invention on the premise that all possible conditions can be met.



But is the concept of "repair by overall supporting" acceptable or not? We can answer this question from two aspects. On one hand, it should be recognized that this option is intended to preserve all the historical information about the Wooden Pagoda over the past 1000 years in an exhaustive manner. This idea is in the spirit of the Venice Charter. "Imbued with a message from the past, the historic monuments of generations of people remain to the present day as living witnesses of their age-old traditions." The overall supporting process will not cause the replacement of any single pillar, beam or bracket. Even burrs of cracked beam timbers would not be removed, cracks not filled, and traces not erased. This approach leads to genuine "comprehensive and thorough protection." The whole pagoda will be sealed in transparent silica gel and exist well forever.

On the other hand, in evaluating a protection concept, we should also take into account the most important and outstanding values of the pagoda. As one of the most outstanding example of ancient architecture of China, the wooden pagoda bears essential features as a building, such as those in structure, material, stress system, techniques, artistic expression and more. But the wooden pagoda is a building with its own spatial qualities. The Buddha's altar in the middle part of the pagoda and surrounding paths meet different needs of the deity and the human. From its structural system, we can feel the transmission of force, such as clear textures of the wooden pagoda's beams and brackets. Only by preserving these qualities can the pagoda's values be demonstrated. If its original space is occupied and its original structural system is not recognized, how can the pagoda demonstrate its values as a building? "The wooden pagoda should be a living and organic structure, instead of being a lifeless sample." But it seems that the



图版二十四　首层及二层平座层剖面（西北-东南）

overall support plan can hardly meet the needs of both the abovementioned aspects. In addition, how feasible will the overall support plan be from the technical perspective? An independent suspending steel frame is required, but where is its pivot set? The more difficult is how to support these components. Therefore, the overall support plan has some active meanings but is far from being mature and comprehensive and even lack of feasibility.

iii. Lifting the Upper Part and Restoring the Lower Part

If "dismantle and restore" and "overall supporting" represent two extremes in protecting this historic monument, do we have any eclectic choice? Lifting the upper part while restoring the lower part, initiated may be the wider acceptable option.

While the main body of the Yingxian County Wooden Pagoda is a wooden structure, there is an adobe wall of consolidation between the internal and external circles of columns on the first floor. This wall, nearly 1 meter thick, substantially enhances the structural rigidity of the ground floor and let it seems like another base of the pagoda. In this case, all the load of the stories above the wooden structures and transformations have occurred only on the second floor. Usually, the lower story has greater load than the upper story and thus the second floor becomes the story with the greatest load. The current situation is that wooden components of the second floor are most seriously damaged, with more inclined, cracked and deformed parts than any other floor. Therefore, the second floor is the section in urgent need of repair. The third floor is better than the second floor. The fourth and fifth floors are basically in the good state of preservation and do not need repair. Under the circumstance, restoring the second floor while keeping other floors unchanged becomes an option.

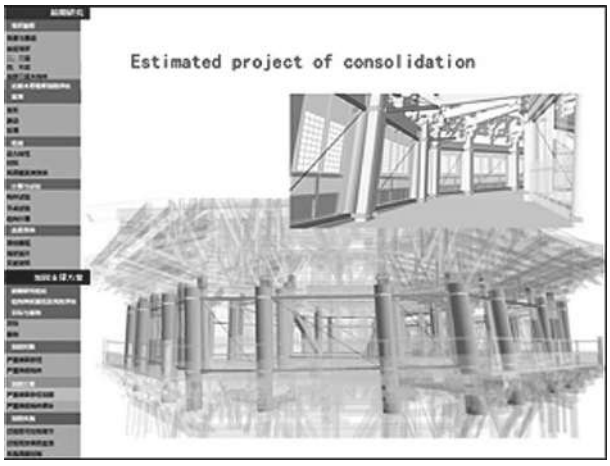
Therefore, we can uplift the stories above the second floor and merely dismantle and repair the second floor, and then put them back after the second floor is restored. With the thorough explanation of the "repair by dismantle structures" and "repair by supporting the whole structure" approaches, it will be much easier to understand the option of "uplifting the upper part while restoring the lower part." This option draws upon from the strength and advantage of the other two above-mentioned approaches while avoiding their weak points. But there is one thing that must be emphasized: though this option requires only a much smaller portion of dismantle work than the first approach, it does need dismantle and thus loss of historic traces and elements will be unavoidable. Moreover, comparing to the second approach, this option also needs supporting work, although the supporting system works only on certain parts of the pagoda in a temporary manner, and it will not permanently replace the wooden pagoda to bear load. After restoration, the wooden pagoda has to bear loads by itself. From the perspective of protection concept, this option will leave great space for choices in the future. That is why this option is merely one step away from implementation.

What we should do now is to reflect on why it is merely one step away from reality and it is not accepted at last just because of technical uncertainties, while there is the reason that it more or less needs dismantle work which is not widely recognized. The general concern is if the wooden pagoda

can be uplifted with mature technology and when it does be uplifted, if it can be put back to the original place on the second floor safely and exactly.

Concerns about the "uplifting" option are of course reasonable, but all technical problems that may happen could be solved. The biggest problem in fact is involved with people's psychology. Is it time to restore the wooden pagoda in such an intensive manner and at such a great price? People's attitude towards the abovementioned options indicates that the answer is obviously "no."

IV. Conclusion

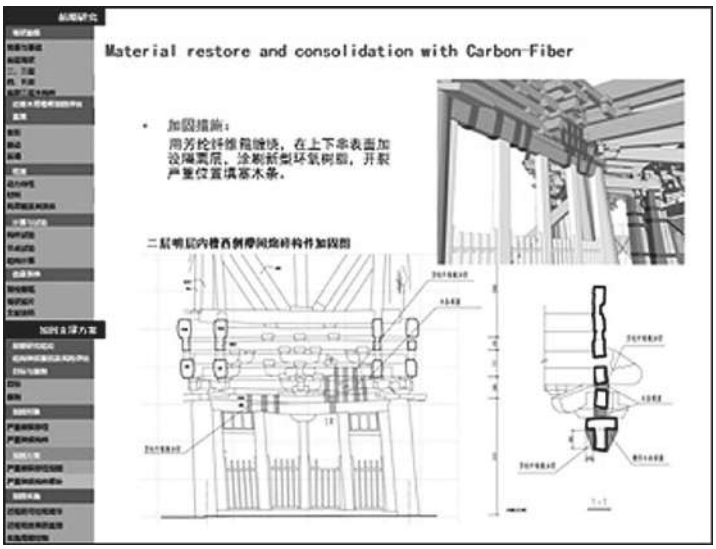


Over the past several years, we have always kept in mind and shown respect for efforts and contributions made by our predecessors in the research and protection of this historic pagoda. Based on their work and integrating previous restoration concepts and technology, we should try our utmost to find a new way.

As the time is going and the risk of the pagoda is growing, we have to do something for the conservation of the monument. To give up all the approach I motioned above, the choice that could only possible now is consolidate and repair in the current condition. In this case we have aim and principles due to the repair work:

1. Aim of approach

（1） stop and lower the slop
（2） strengthening the structural in all
（3） repair the components in test



2. Principle

（1） structural safety
（2） limited approach
（3） reversible
（4） keep original structure and conjunction
（5） keep original material
（6） easy work
（7） separately and step by step
（8） test advance

Conservation of Wooden Elements in the Architectural Heritage of Nepal

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Abstract
It is a challenge to safeguard wooden elements in architecture from the numerous threats they constantly face. Wood can deteriorate if not continuously maintained. When this deterioration begins, what is the right approach to restore these elements? How does one understand this in respect to the authenticity of the heritage structure? This paper presents seven examples of use of wood in architecture in Nepal, each giving specific insight into the issues that need to be considered when trying to conserve wooden elements. The examples consist of palaces, temples and dwellings from a period spanning over two and half millennia and located in diverse topographical locations of Nepal. The lessons learnt from these examples provide the framework for developing an appropriate approach to conservation. A compromise must be found between replacing and retaining the original materials in the original location despite the condition these elements are in. Conservation must find the balance between authenticity and integrity, between safeguarding and utilizing and between freezing in time and allowing interaction with the supporting living heritage.

Keywords:
wooden architecture, conservation approach, built heritage, material authenticity, Nepali architecture

1. Introduction - wood and traditional construction in the diverse settings of Nepal

1.1 Wooden architecture and the discourse on authenticity

Nepal has had a central role in the international discussion on authenticity in respect to conservation of built heritage. In 1992, the Wood Committee of the International Council on Monuments and Sites (ICOMOS) met in Kathmandu and critical comments were made on the restoration work being carried out on *I Baha Bahi*. This was the beginning of a dialogue that led to the preparation of the "Nara Document on Authenticity" in 1994.

1.2 The context and the use of wood for construction

The Himalayan region is characterized by a mosaic of diverse landscapes, climates, ethnicities and cultures. The creation of this fascinating landscape is due to the collision of the Indian Plate into the Eurasian plate. The Indian Plate was subducted under the Tibetan plateau, deforming and raising the Tibetan block, while the floor of the Tethys Ocean was lifted and folded upwards and then backwards to the south. As the mountains were formed, a climatic barrier was created with the northern areas drying up and the southern flanks being eroded away by high levels of precipitation.

When the great mass of rocks was piled up, the weight was so great that it settled and tilted back to regain equilibrium, shearing from the surrounding landmass. This blocked the rivers and created lakes along the whole range. Some lakes continued existing in the valleys such as Srinagar and Kathmandu. The lake of the Kathmandu Valley is believed to have drained out over the past thirty thousand years and possibly for the last time around eighteen thousand years ago. Sediments were gradually deposited at the bottom of the lake providing fluvio-lacustrine clay and sand. The black clay contained decayed organic matter from the lake which made it extremely fertile. Bands of peat and coal were also present which show that the valley was swampy and dry alternatively (Smith 1978).

Over centuries people migrated to this fringe area between the ancient cultural spheres of South Asia and East Asia. They came either to flee from persecution or in search of new prospects. The Himalayas have been both a climatic barrier as well as a cultural barrier where the amalgamation of cultures has taken place on the fringes of the civilisations of Indian and China. They brought with them their religion, their language, their craftsmanship and enterprise. Where the economy allowed, the forms of settlement and shelter developed to express the more complex character of a civilisation.

Within this diverse landscape, wood became an important component for construction. Throughout the region, wooden posts support wooden beams and rafters that hold up the roof. Wooden construction is used in combination with earthen, stone or brick walls. Depending on the location and importance of the building, the quality, workmanship and ornamentation of the wooden elements differ. The following sections will provide a diverse range of examples showing the use of wooden elements in the architecture in the various locations and over time within the present boundaries of Nepal.

1.3 General threats and their response

Wooden elements in built heritage can be subjected to physical, chemical and biological threats. The decomposition of timber which has already been used for construction can be caused by dry rot, when a fungus grows under warm and damp conditions with no sunlight and air circulation. The fungus spreads web-like over the surface of the timber and then penetrates into the material. Timber can also be destroyed by insects and worms that bore tunnels into the materials. Timber structures can catch fire. The physical destruction of timber can be caused when the structural strength is overstressed. This can happen due to various natural hazards, especially in the case of an earthquake. Physical weathering of timber can also cause deterioration.

The responses to these threats are not always possible. Wood can last for many centuries or even millennia if the threats are neutralized. There are various means of response to damage that has already occurred. There is the possibility of stabilizing the decay or removing the elements from the impact of threats by placing these in more secure locations such as in a museum where even the microclimate can be monitored. This is however not possible for elements that are part of the structural integrity of the architectural object.

One of the major problems that restoration efforts face is the lack of appropriate materials. This might be the unavailability of the exact type of wood and often the quality of the wood and its preparation. Naturally seasoned wood is rarely available, and therefore the reuse of the original materials is a better option where possible. The supply of wood is also based on a forestry policy for the sustainable production of timber. Another major drawback for restoration projects is the quality of workmanship. There is a lack of interest in younger generations to take on the professions of carpenter and wood craftsperson.

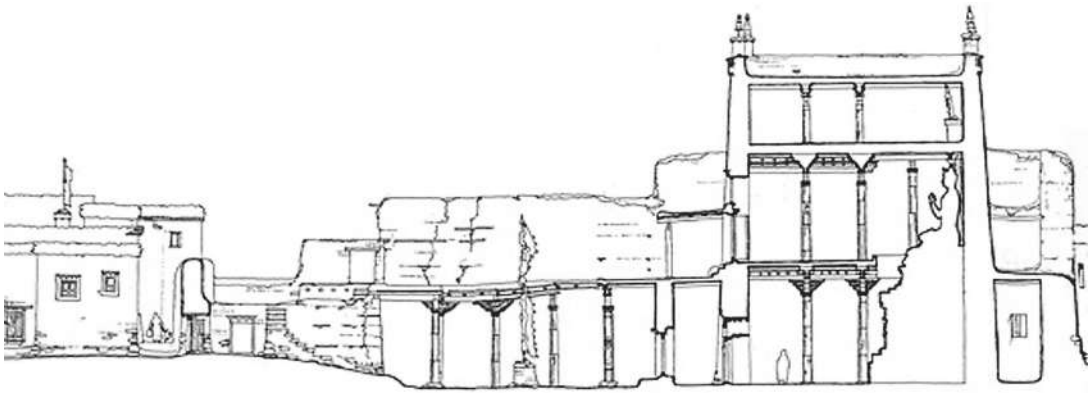
1.4 Intent of the paper

This paper contributes to the overall discussion on conservation of wooden elements in built heritage. It however more specifically sets out to analyse the use of wood in architecture in the various geophysical settings of Nepal and provide a basis to formulate a conservation approach for wooden elements used in historically significant buildings. The case studies include the following examples: (1) The monasteries of Lo Manthang, (2) moving villages in Upper Mustang, (3) Tansen Durbar, (4) traditional buildings of the Tamangs in Rasuwa and Charikot, (5) Use of wood in traditional Newari Architecture, (6) The restoration of palaces in the Kathmandu Valley and (7) Traces of wooden architecture in Lumbini.

2. The Trans-Himalayan Region – beyond the high mountains

2.1 Case 1: Monasteries of Lo Manthang

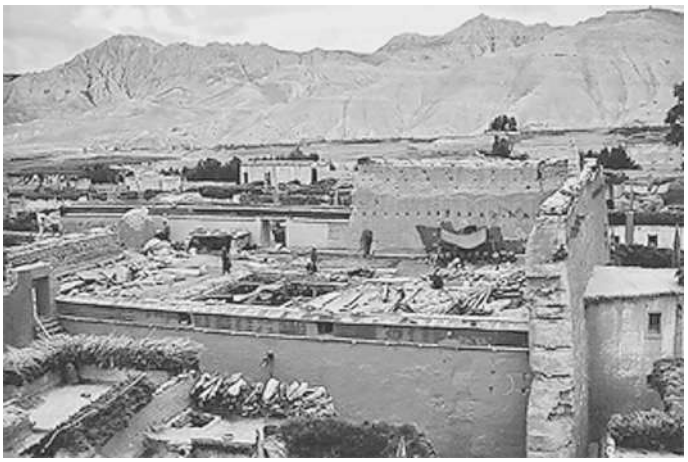
Within the ancient walled settlement of Lo Manthang in Upper Mustang, there are three important monasteries, of which two are from the fifteenth century: Thubchen and Champa. These structures are built of massive earthen walls, with composite wooden posts holding up beams and rafters. The roofs of the impressive central halls are held up by posts that rise over seven meters. The earthen walls are covered with exquisite mandala paintings. However in the 1990s, these gompas were in a state of disrepair. There was leakage, parts of the roofs were sagging and certain external walls were cracking. These structures needed to be restored taking into account the importance of the mural paintings.



Sketch through Champa Lakhang (John Harrison, 2006)

Traditionally, the wooden elements of gompas are replaced, especially the roofing, but also other structural elements, doors and windows. Whoever sponsors such activities is said to gain merit (Chapagain and Silva, 2013, pp. 52-3). The replacement of the original materials however goes against conservation practices of ensuring material authenticity. In the following restoration works carried out by John Sanday's team for the American Himalayan Foundation, it seems that a compromise was found between retaining and replacing wooden elements. Here the question seemed to be how to set priorities between the huge clay statues of divinities, the mural paintings and the actual building structure.

The roofs of the monasteries had to be repaired, and was replaced using the traditional materials: round timbers, river stones, and local clay for waterproofing. The rafters of the roof structure of Champa lakhang were replaced with wood that was procured from across the border in Tibet. The main beams were however retained. 'The composite beams were made up of eleven sections of timber, which were held together with iron stirrups to form a hollow beam, about 75cms wide and 75cms deep. Over the centuries, these beams had twisted and racked as a result of seismic movement.



Restoration of Champa Lakhang (Sanday, 2011)

Rather than trying to put them in straight lines, it was decided to repair them and to leave them in their twisted state retaining their patina of age. The beams were cleaned to expose their original colours and the lacunae were an authentic match.' (Sanday, 2011)

2.2 Case 2: Moving villages in Upper Mustang

Upper Mustang has a rich heritage of vernacular architecture. The buildings are adapted to the harsh climate, providing protection from the winds, the cold and solar radiation. The more elaborate buildings have rooms opening into a protected inner courtyard. The external walls have few and only small openings. The ground floor is used for animals and storage. The main living quarters are on the upper floor with the roof being used for household functions.

Remains of abandoned structure with wooden elements removed;(Weise)

Inner living space of traditional dwelling

Each room is enclosed with earth walls, the roof or next floor being supported by central wooden posts. Wooden brackets on the posts give better support to the main beam, which are supported on the ends by additional posts or stone wall-plates. The joists are usually round sections of 15 cm diameter, placed 45 cm apart. The joists are covered with planks or split wood, a layer of wheat stalks and twigs covered with approximately 10 cm of packed white clay. The side walls are raised slightly above the level of the roof to clamp down the beams and joists. These parapets are often covered with stone slabs and are used to dry firewood for the winter. The openings along the external walls are usually small. In some cases a double frame is used to support the thick rammed earth walls. Nevertheless, the larger windows that open onto the courtyard use the traditional Tibetan design. A single frame is use, often carved and painted. Wooden blocks that span the width of the wall are fixed perpendicular to the top member of the frame, which is then covered with wooden planks to hold the earthen wall. The wood used is most often Pine, though in the older buildings the main structural elements were constructed of Juniper. The forests that supposedly covered certain parts of the slopes of Upper Mustang are no more, and wood has to be carried up from the community forests of Lower Mustang.

Throughout history, there seemed to have been the need to move settlements based on the availability of water. There are traces of abandoned settlements scattered throughout Upper Mustang. This is a fascinating phenomenon and little has been studied on how the community carried out such a colossal task. For example near Gemi there is a long mani-wall, a prayer wall piled high with stones and adorned with prayer flags. Today the mani wall stands on a large plain along with a few chortens indicating the extent of an abandoned settlement. The wind has swept away the discarded earthen walls, while the religious structures continue being maintained by travellers. Further to the east, away from the main track, there are more remains of an abandoned settlement.

I was told me that it was often due to the lack of water which was either that the source dried up or that the community become too large for the finite supply. First an appropriate site was identified and prepared. All wooden elements such as beams, posts, doors and windows which were otherwise difficult to obtain would then be transported from the old site and reinstalled in their new houses. The reuse of the wooden elements would have required a similarity in design of the new buildings and thereby would have provided a continuity and linkage between the old and the new settlements. These are anecdotes that have become the community's oral history passed down from generation to generation.

3. The Mahabharat Region – the foothills

3.1 Case 3: The Tansen Durbar

On the night of 31 January 2006, the Maoists attacked Tansen and destroyed the Tansen Durbar and surrounding historic buildings. The significance of the Tansen Durbar Complex goes far beyond the heritage value of the individual buildings; it is an important landmark for the identity of Tansen, has political and historic significance and is a critical component for the future development of Tansen. The components that had heritage value were the cluster of buildings around the Silkhan (armoury) building to the southeast, the palace itself, and the buildings along the north and northeast corner including the Baggi Dhoka (carriage gate). Most of the buildings would have been built in the early 19th century during the reign of the Sen Rajas, though the palace itself was reconstructed by Governor Pratap Shamsher J B Rana in 1927.

Tansen Durbar in flames
(Image courtesy of Man Mohan Shrestha)

The Silkhan with all the timber elements burnt. To the left was the wooden veranda

When the Maoists attached Tansen, they laid siege to the palace which housed the office of the Chief District Officer, including police and army facilities. After several hours of heavy fighting, the Maoists swarmed into the buildings, and torched the historic buildings while retreated with the hostages. The Tansen Durbar was totally gutted and continued smouldering for four days. All the wooden elements, especially of the eastern and northern wings were fully burnt, leaving only the brick walls. The outer shell of the north-eastern tower remained standing and was later pulled down. The Silkhan building was totally destroyed. The wooden posts along the northern ground floor veranda burnt down, leading to the total collapse on that side. The central wall on the ground floor and the southern wall still stand. Other buildings around the Silkhan building were also totally gutted. (Weise, 2006)

The gutted palace, no wooden elements remaining

Already a few weeks later, the brick of the Silkhan building were being trucked away by the army to build new barracks in their main camp. The entire building was later demolished. The fate of the palace building was however determined by the interested shown by the community and experts. Taking into account that Tansen is on the tentative list for World Heritage nomination, it was decided that the traditional method of construction would be used. It was also noted that since traditional buildings of that scale were structurally resilient, there was no need of using reinforced cement concrete. The design nevertheless did incorporate wooden reinforcement elements into the brick masonry. The reconstruction was carried out by the Department of Urban Development and Building Construction in cooperation with the Department of Archaeology.

New construction with timber reinforcement

3.2 Case 4: The changing traditional buildings of the Tamangs in Rasuwa and Charikot

Tamang houses are found scattered across the slopes, built on the individual plots of terraced farmland. Most buildings in the central Himalayan foothills are of stone rubble masonry with earth mortar. The Tamang houses around Charikot for example are usually two storied with a rectangular floor plan 3.5 to 4 meters wide and 5.5 to 7 meters long with 2 central wooden posts. The wooden elements play an important role in the traditional architecture; however these elements are most often replaced with cement concrete.

A central row of about 15 by 15 centimetre square hardwood posts, placed on a foundation stone, support the floors and the pitched slate roof. Pinewood is used for all other construction, since at an altitude over 2000 meters; there is little risk of insect infestation. The main longitudinal beams (12/18 cm) rest on the posts and support the joists (7/10 cm). The joists penetrate the stone work and are sandwiched between two layers of planks providing a surface to absorb structural movement, separating the stone masonry on each floor.

The slate roofs are gabled. The roof projection is wound around the gabled end for protection. The rafters (7/10 cm) are connected with a half lapped joint, supported on a central ridge beam and on wooden wall plates. The struts that support the projecting rafters are fixed to wooden sections embedded horizontally into the stonework and held in place with wooden pegs. All openings have 2 wooden frames, one on the inner face and one on the outer face of the wall. The openings are kept narrow to reduce the load on the frames. The frames are secured by the top and the bottom members of the frame projecting into the stone masonry.

Typical Tamang house in Charikot

Typical Tamang house in Rasuwa

Extension to monastery in Dhunche

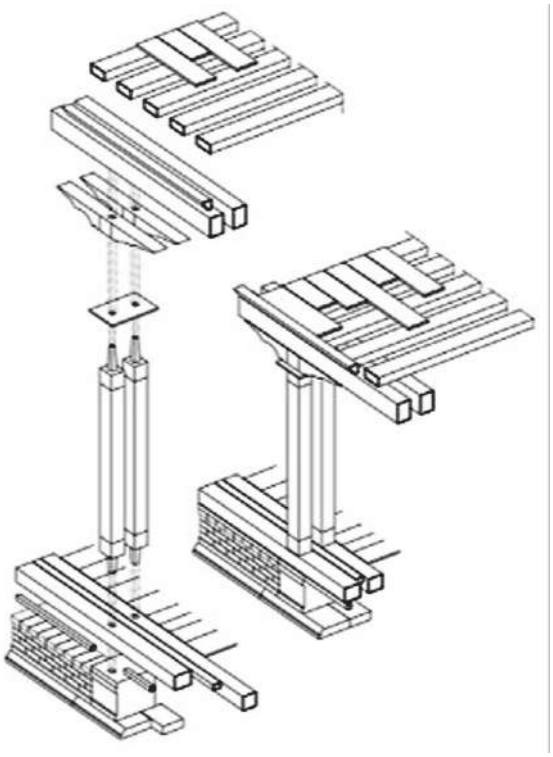
Easy road access to places like Charikot and the Rasuwa district has had major impact on the traditional building methods. The most impact is on the wooden elements such as the flooring and roof construction which is being replaced with cement concrete. However the modern methods of construction are not adapted to the climate, are of bad quality and even the stability of the reinforced concrete frame structures are inadequate. The slate roofs are replaced with corrugated iron sheets which then fix to metal trusses. The flooring and balcony projects are reinforced cement concrete replacing the wooden joists and posts. This can even be seen in the monasteries in Rasuwa, where all reconstruction and maintenance is done using modern materials, considering that it is not possible to constantly maintain the traditional structures.

There seem to be several reasons for the changes. Primarily wood is used sparingly since prices especially for hardwoods are high due to a lack of supply created by inadequate forestry management. The community based forestry projects have managed the supply of a basic amount of softwood, mainly red pine (Pinus roxbughii). A further reason for the change in construction materials is the lack of specialized workman, since the entire construction industry has converted to the use of modern materials. A final reason for the use of modern materials such as reinforced cement concrete is the image factor. For many people it is a status symbol to have a concrete building which is considered to be safe, easy to clean, requiring less maintenance and providing the image of an urban dwelling.

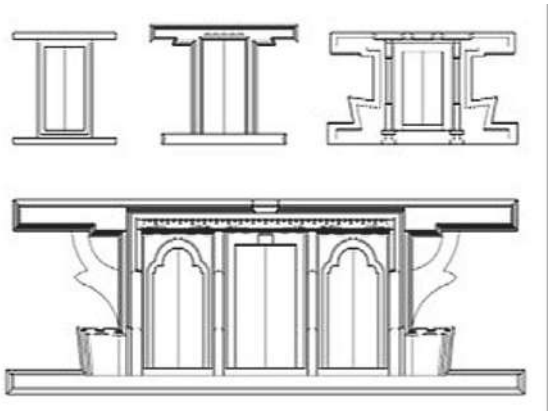
4. Nepal Mandala - the Kathmandu Valley

4.1 Case 5: Use of wood in traditional Newari Architecture

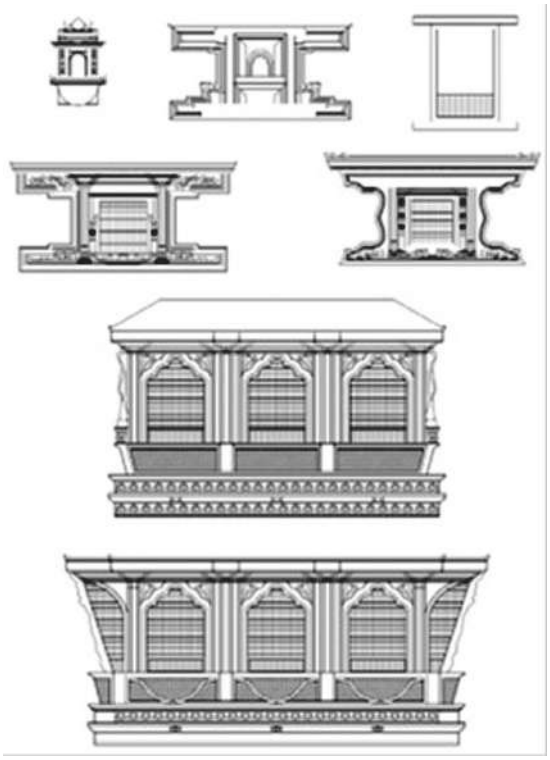
Most Newari buildings are constructed of a combination of wood and brickwork. The wooden elements in the construction of the roof are simple structures, not as elaborate as the Chinese and Japanese systems. In the temples, the central cella is of thick brickwork, which is then surrounded by a series of wooden posts creating a corridor. The posts are fixed using notches to wooden beams (or stone base) and brackets. The large overhangs are there to protect the buildings from the Monsoon rainfall and intense solar radiation. The roof of the tiered temples for example are placed in a radial arrangement supported form the central brick walls and an eave beam which is turn is supported by decorative struts. The flooring is comprised of closely laid wooden sections covered with bricks or planking covered with a layer of earth. Sometimes the earthen layer is then covered with floor tiles. The wooden elements are held in place using wedges and are connected to wall plates that are integrated into the brickwork. The doors and windows are another unique part of the Newari buildings. The many elements that make the doors and windows are placed together to ensure that they are structurally compressed. Generally they consist of a pair of frames that hold up the thick brickwork that continues above the openings and thereby become an integral part of the structure. The door and window elements are often profusely carved. On the upper floors, special windows are often placed in a tilted outward to allow people to view the streets through the latticework. These highly decorated windows were also a status simple, with the number of bays indicating the importance. The ultimate expression of this status was the 55 window palace in Bhaktapur (Bonapace and Sestini, 2003, pp. 54-67).



Construction system
(Bonapace and Sestini, 2003, p. 62)

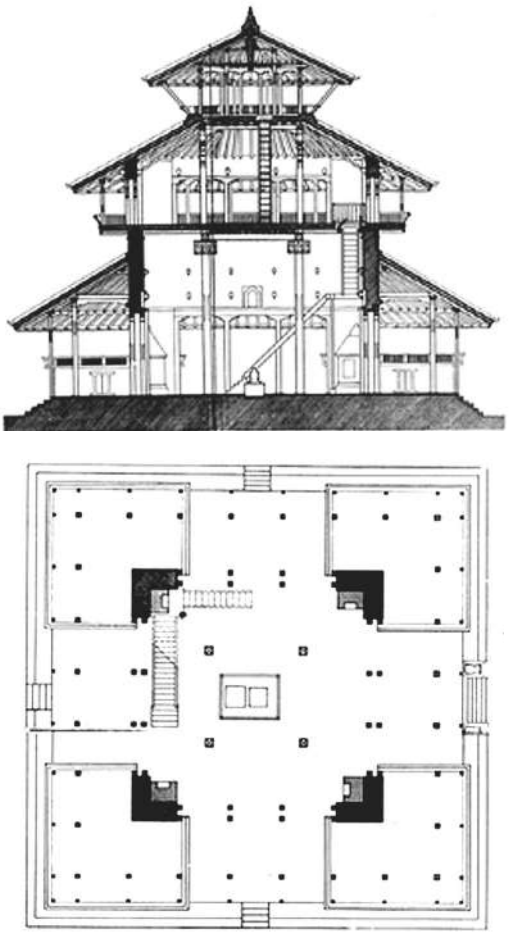


Typical Newari door frames (Bonapace and Sestini, 2003, p.67)



Typical Newari windows
(Bonapace and Sestini, 2003, p.69)

The construction technique for wooden elements is based on assembling the components without use of nails or screws. This allows for repairs and replacement of elements to be carried out more easily. The only fully timber structures are possibly the assembly hall or *Mandapa*. These are pavilion like structures, usually single-storey, with a pillared hall in square plan. An impressive example would the Kasthamandapa in Kathmandu. One can however assume that originally, especially during the Licchavi period (3rd to 7th century CE) wood was used much more extensively. Even the Chinese traveller Hiuen-tse mentions all the houses being constructed of wood, including the palace which was burnt down. Possibly due to shortage of good timber, the wooden elements were reduced. For example the early Malla windows contained much more wood than later versions (Scheibler, 1988, p. 137). This same problem persists today, which greatly impacts conservation efforts.



Kasthamandapa (Korn , 1976, pp. 95. 97)

Under common building defects, it is possible to mention timber elements especially on the façade. Doors, windows, posts and beams are impacted by weathering, decay and fungal attack. Another area of defect can be the timber structures of the roof, where there is leakage and rainwater seeps into the underlying structure. These defects are frequent and affect the buildings especially due to lack of maintenance. In timber construction, the structural stability lacks diagonal bracing and often lack integration with the brick work. Timber elements which are subjected to humidity, leakage and splashing rot quickly. These would be the end of posts on the ground floor, joists that embedded in humid walls and exposed elements of the roof structure. The dead weight of the traditional roof can have an impact on the structure, since there is a 5 to 8 centimetre thick layer of clay on the roof into which the *jhingati* tiles are embedded. (Scheibler, 1988, pp. 141, 163-164)

Newari	Nepali	Latin	Density	Use
Dhusishin	Sal / Agrakh	Shorea robusta	800-960 kg/m^3	columns, capitals, supporting beams, stairs, window frames, door frames, rafters (great loads and weathering)
Thashin	Salla	Pinus roxbughii	500 kg/m^3	floor beams, door leaves, roof rafters, lattice screens (protected from elements)
Gwechashin	Chilaaune	Schima wallichii	690 kg/m^3	roofing plate, special ridge piece, sometimes windows
Shushin	Phalaant	Quercus glauca	930 kg/m^3	windows, doors, sometimes roof rafters
Chashin	Chaanp	Michelia champaca	460-660 kg/m^3	windows, furniture (good carving but easy weathering)
Lapsi	Lapsee	Choreospondias axillaris	400 kg/m^3	posts, capitals
Lobasi	Utis	Alnus nepalensis	320-450 kg/m^3	rafters
Nawashin	Paasen			seldom: capitals, wheels of carriages

Chart from Scheibler, 1988, p. 129, density from http://www.forestrynepal.org (accessed 10 November 2013)

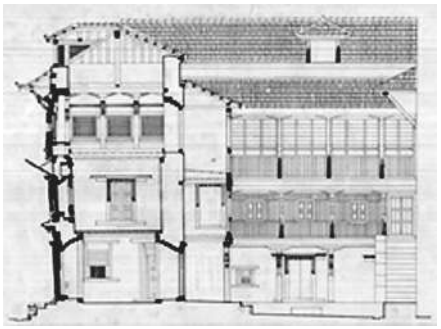
‘Eight types of wood are used in the construction of the traditional temple or house according to their different characteristics’ (Scheibler, 1988, pp. 128-129)

Additionally Haldu and Sisau, Bakaina, Alp, Padke, Simal, Karma, Sisame are also used. A resinous oil obtained from the Sal tree, was used to protect and conserve the wooden structural and construction elements of buildings exposed to open air. (Bonapace and Sestini, 2003, p. 49)

4.2 Case 6: The restoration of palaces in the Kathmandu Valley

The 55-Window Palace in Bhaktapur was constructed by King Bhupatindra Malla in 1697. The top floor of the palace was severally damaged during the 1934 earthquake and was restored with various alterations. Since this part was mainly constructed of wood, the salvaged wooden elements were reused. These elements were however reinstated haphazardly without consideration to their original position. The entire row of 55 windows was placed back, however without the original projection. In the 1990s proposals were prepared for the restoration of the 55-Window Palace and the discussions continued over several years engaging both international and national experts. The central wall of the palace was covered with a mural painting that required stabilizing. Finally a team of national experts and artisan carried out the project with employing local knowhow and materials. The restoration works were carried out between 2003 and 2008. The entire structure was stabilized by introducing timber posts and beams to reinforce the structure, with large parts of the brick walls being reconstructed. The wooden elements were cleaned, fixed and reused. The top floor windows were reinstated to its original position. According to Sudarshan Raj Tiwari, “Completed in 2008, the success of the project underlined the importance of taking traditional knowledge, techniques and craftsmanship as the preferred approach for retrofitting and restoring historic buildings” (Weise, 2009, pp. 44 – 46).

55-Window Palace after the 1934 earthquake (GTZ/udle , 1995, p. 103)



Section through 55-Window Palace (in Weise [ed], 2009, p.45)

55-Window Palace November 2013

The ongoing restoration work on the Mul Chowk and the Sundari Chowk of the Malla palace in Patan is being carried out by the Kathmandu Valley Preservation Trust (KVPT). Led by Rohit Ranjitkar, the ongoing works show the prevalent approach to dealing with the wooden elements. The challenges of such restoration projects were highlighted by Rohit Ranjitkar during various discussions in October and November 2013. Due to the constant impact of earthquakes on buildings, previous restoration works carried out by the community over the centuries show that elements from other buildings were used to restore the palace. This is especially visible in the struts from various periods used in the Mul Chowk, which were often cut to size or extended to fit in their new position. This means that it is not possible to clearly distinguish what would be considered the original material. The approach taken by the KVPT has been to prioritize retaining the wooden elements in their

Carved wooden elements retained in Mul Chowk restoration in Patan, 2013

original state and position. Interventions are necessary to the wood that has deteriorated by rot, weathering or termites. The wooden element is cleaned using only kerosene, since other chemicals haven't proven to be effective unless constantly reapplied, which is not practical in the local context. The deteriorated wooden elements without any carvings are replaced. All elements with carvings are reinstated after with the required additional stabilization. For example carved struts that might have partially deteriorated are placed back in their original position with a metal support. In some cased, the lost components of the carvings are added if the design is clear and it is possible to recreate the component using the local crafts persons.

5. The Terai – the jungles of the southern plains

5.1 Case 7: Traces of wooden architecture in Lumbini

Inscription on the Asokan pillar in Lumbini from second century BCE

Inscription on the Asokan pillar in Lumbini from second century BCE

Post holes testifying Pre-Mauryan wooden structures in Lumbini (Photo: Nabha Thapa)

Traditional building form with wooden posts and tile roof in villages surrounding Lumbini

The archaeological remains at Lumbini are a testimony to the birthplace of Lord Buddha and the site was inscribed on the list of World Heritage in 1997. The main evidence of this place being the birthplace is the inscription on the stone pillar erected here by Emperor Ashoka in the second century BCE. The remains of the bricks that date from the second century BCE to the seventh century CE are testimony to the site being a site of pilgrimage over many centuries. It is only during recent excavations carried out by the Department of Archaeology and Durham University within a Japanese funded project of UNESCO that clear evidence of Pre-Mauryan structures within the central temple area came to light.

The temple area was defined "through the construction of a double kerb of brick on edge. Tempered with rice husk, these bricks were highly distinctive as they measured 49 × 36 × 7 cm, weighed 20 kg each and had one face marked by deep finger grooves. The area to the immediate south of the kerb was paved with the same bricks, although many of them were broken in antiquity. Surviving areas of this simple brick platform have been identified in other areas of the temple, suggesting that it originally covered an area of some 26 metres north-south and 21 metres east-west" (UNESCO, 2013, p. 81).

Before the use of bricks was introduced, the materials used for construction was wood. The wooden elements however do not exist anymore. This shows that wood cannot sustain such climates and soil conditions. 'The first evidence of structural activity at the Mayadevi Temple occurred in the middle of the sixth century BCE with the cutting of a straight line of post holes defining the centre of the mound. Soil micromorphology indicates that the central area of the temple, defined by wooden fence or railing, was void of structures and the stratigraphy and soil sections suggest the presence of substantial roots, perhaps indicative of a tree (UNESCO, 2013, p. 81).

This is an interesting concept, considering that from the most ancient of structures, only the negative imprint remains. There are

similar cases in other early Buddhist archaeological sites such as in Tilaruakot, where it is know that the city was destroyed and set on fire. There are charcoal remains from the period, with only the brick walls of the ramparts and the palace remaining in original material form. This shows that wood is not a material that can withstand the test of millennia.

6. Conservation of wooden architectural elements in the context of Nepal

We are still experiencing a dilemma in finding a clear and acceptable approach in the conservation of wooden elements. During the second cycle of periodic reporting on the implementation of the World Heritage convention in Asia and the Pacific, a categorization of all cultural properties was carried out based on materials used. The statistics shows that 52 properties were considered to use wooden construction, which is affected by a wide range of factors, such as natural disasters, tourism, infrastructure development and management. (UNESCO, 2012)

Wood as a material has specific characteristics which determine its resilience to the many factors affecting it as a construction material. The above seven examples of wood being used in architecture within the context of Nepal were presented to better understand the material, its use and its resistance to factors affecting its endurance over time. A summary can be made of the issues which would determine the understanding and the approach to conserving of wooden architectural elements.

In most conditions, wood does not last for many centuries as does stone and burnt bricks. In many archaeological sites we only find the negative imprints of where wooden elements were before they decade or wood in the form of charcoal. Wood gets affected especially be damp and weathering, which leads to rot and biological infestation. Wood is also vulnerable to fires, as shown in the case of the palace in Tansen.

In all seven cases, wood has been used as a critical material for posts, beams, wall plates, rafters, struts, etc. These wooden elements fulfil structural functions and would therefore need to continue being intact. If these structural elements lose their capacity to fulfil their function, they must either be replaced or a new element needs to be introduced to take over that function. The examples show the value given to wooden elements, especially in the case of Upper Mustang were when villages were moved, the wooden elements were taken along to the new location.

Wood is also used for ornamentation. Either the structural elements themselves are decorated through carvings, or additional carved pieces are added for aesthetic purposes. These carved elements are also symbols of social and economic stature. In the Malla period, the carved windows reflected the social standing of the inhabitants, the ultimate being the 55-Window palace in Bhaktapur. These elements are not easy to replace, since the craftsmanship, time and money that goes into any kind of reproduction is difficult to come by.

In all these cases we see that wood is a valued material. The conservation of these elements however requires constant maintenance and care that they are well protected. Conservation of the wooden elements of the architectural structures requires a source of good materials, continued knowhow and skills for the required fixing and reproduction of lost components. The structural integrity of the buildings must be ensured, even if it necessitated the introduction of modern materials that are however no intrusive and reversible. The artistic and decorative elements must retain their authenticity. This fine balance between the functional integrity of the architectural heritage and the authenticity of the artistic elements must be found, specific to each the characteristics and the context of the object.

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Restoration of Tampita Vihara (Temple on Pillars) at Dambadeniya

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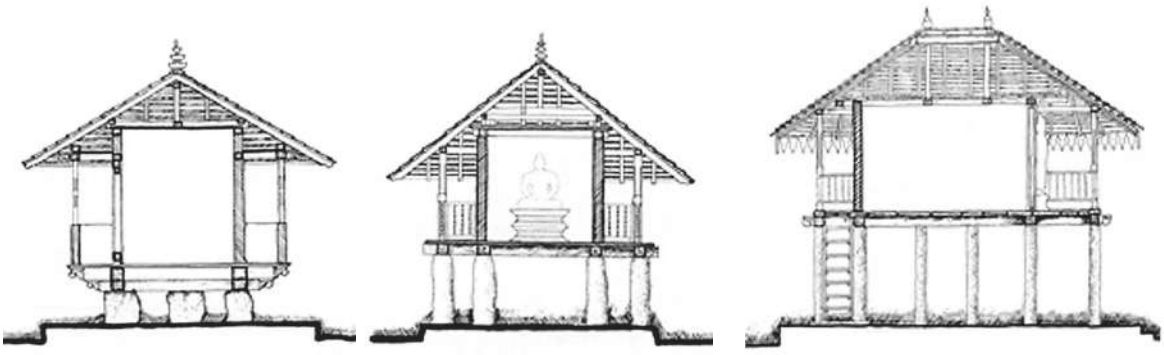
As a tropical country, Sri Lanka has a highly humid and temperate environment. The ancient architectural creations have been built to withstand this condition and the temples on pillars can be stated as one of the best examples of them.

What is a temple on pillars?
Temple on pillars is a structure which built on stone pillars or boulders on a raised platform. The super structure is made with timber beams on these pillars with wattle and daub walls and covered with a flat tile laid roof on a timber frame.

This technique it is protects the super-structure from the dampness and wetness of the ground. Also in the dry season, the ground becomes warm but the building is protected from the heat. If a building is subjected frequently to warm and cold conditions, its lifetime will reduce specially due to the expansions and contractions.

Therefore hundreds of these type buildings are still in the protected and preserved conditions although they are more than 200 years old.

The height of the pillars varies from 2 feet to 10 feet depending on the design of the building and if the pillars are high the buildings are recognized as two storied. They are called Tam (Pillars)-pita (on) - viharas (Temples).



Types of Temple on pillars

History of Dambadeniya Tampita Vihara

The temple on pillars in Dambadeniya vihara, is believed to be built by King Wijayabahu the 3rd (1232-1236 AD), who was the first king of Dambadeniya Kingdom.

According to the Mahawamsa, son of King Wijayabahu the 3rd, King Parakramabahu the 2nd (1236-1270 AD) brought the sacred tooth relic of the Buddha which was kept at Beligala (some 40km away) and kept in this building to be worshiped by the people.

The remains of the royal palace close to the temple on the rock called Maligagala were discovered in an excavation by the Department of Archaeology. There are remains of Palace, ponds moat and city walls around the rock.

Site Plan of Dambadeniya

After the death of King Parakramabahu the 2nd, the tooth relic was taken to the new kingdom in Yapahuwa and the buildings in Dambadeniya were abandoned. It is known that this building was restored by Meegastenne Adhikarama in Kandy period. Thereafter there were many interventions in time to time.

Architecture of monument

The building is constructed on a stone platform about one meter in height and the main structural columns which support the timber deck are covered by mud walls. The stone platform is faced with smooth finished stone mouldings.

The main timber frame which supports the timber deck and the main shrine consists of three layers. The timber deck is fixed with 3 inches thick timber planks, and the wattle and daub walls starts from this deck.

Priyantha Basnayake

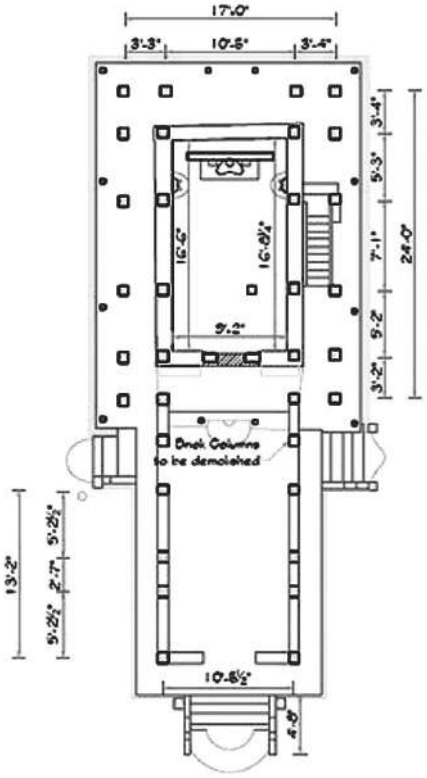
The structural frame of the walls is fixed on to the timber deck, but the four corners to the main timber beams with bigger timber poles. There is a balcony right round the upper deck, which is accessed by a steep timber stair way. Roof is laid with locally made flat clay tiles.

The front portion of the building is the open stone colonnaded drumming hall, but surrounded by a later added mud short wall. The tiled roof of the drumming hall connects by a horizontal gutter, with the lower level roof of the main shrine.

Decorated timber column heads on these stone pillars are significant in this drumming hall and also the decorative timber rafters on the timber beams on column heads are very attractive.

Although the main building and the drumming hall are the constructions of Damadeniya period, the carved column heads, timber beams and roofs are belongs to a latter period. It is believed that this temple was renovated in the Kandyan Kings time. The paintings on the walls and the upper floor sculptures were done in Kandy period.

Therefore the restoration of the monument is complex and careful attention must be paid in preserving it.



GROUND FLOOR PLAN

Documentation and conservation proposal

Before conserve any monument, it is mandatory to record and document the existing condition of the building.

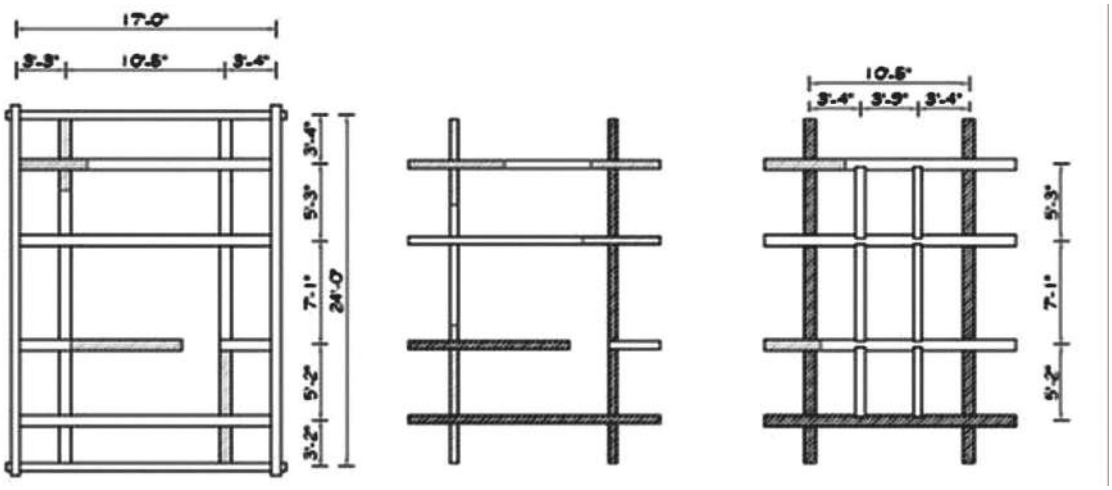
There was no any dangerous subsidence and cracks in the foundation of this building.

As per the accepted norms and procedures followed by the Department of Archaeology, no intervention to the foundations was needed.

The floor of the lower shrine was laid with ceramic tiles, which does not match with the historic character of the monument was proposed to lay with rough granite tiles.

Floor of the drumming hall had been laid with terra cotta tiles and it was decided that they are suitable although it is a later addition. As all stone pillars in this monument were in good condition, no intervention was needed. The decorative column heads and the beams in the drumming hall were in good condition, but several portions of column heads were decayed. These were proposed to conserve by filling with sawdust mixed with glue.

The three sets of main timber beams on stone pillars in main shrine were badly decayed. The entire floor, walls, statues and the roof of the upper floor is rested on these three sets of beams, and therefore restoration of the beams was essential. It was decided to replace some of the beams and parts of the beams.



There were paintings which had been done in recent time on these beams, but it was not a reason to allow the beams remain as it was. So it was decided to replace the decayed beams. There was a concrete layer about 2 inch thick on timber planks in the upper floor of main shrine, and finished with smooth cement grout, as a later intervention. It was decided to remove the concrete layer to reduce the extra weight to the floor slab and the frame. As the plaster layer in the upper floor shrine was weak and tend to peel off, the chemical conservation methods were applied on them. Also the paintings and sculptures were restored with chemical treatments.

Upper roof in the main shrine was in good condition as it was restored 10 years ago. But in the roof of the drumming hall there were three decayed rafters, and it was decided to replace them with new ones. Decayed flat tiles and all reefers will have to be replaced.

The project estimate was approximately, LKR 2.5 million, and the approval was granted to carry out the works by Director General of Archaeology, as recommended by the Director, Architectural Conservation.

Decayed Beams

The works on site

It was essential to erect a covering shelter above the temple to protect the timber portions, wattle and daub walls and paintings from the sun and rain. The concrete layer on the upper floor deck was carefully removed and the roof tiles also were removed. An electric grinder was used to remove the concrete layer as the chipping off with a hammer would cause the vibration.

The upper floor of the shrine was tied together by using GI pipes and bamboo, to make it one unit to protect the structure in removing the main beams. The sculptures inside the shrine were tied with mattresses and cloths to avoid shifting.



Extra timber joists were fixed under the deck and by using two 10 ton hydraulic jacks, the load of the upper shrine was transferred to a number of coconut logs fixed vertically inside the lower level. Some extra timber props were used for additional safety.



The decayed timber of the middle layer was removed first and the others were easy to remove then. A deck to work at one meter above ground floor level was erected for the easy movement of the workers.

Only the decayed parts of beams were removed and other beams were kept as they were. First of all, inserted were the longitudinal beams in lower beam set and then cross beams in lower beam set. After that, upper cross beams and upper longitudinal beams were inserted in order.

Finally by putting the set of middle beams, it was able to finish the most difficult and main restoration work of this monument. To replace the decayed beams we used the “Mee” (local hard wood species) timber as the material which was used originally.



As the bottom part of the main door frame was decayed it was also replaced. After removing the concrete layer on upper floor, it looked rough on the floor planks and therefore one inch thick smooth finished timber planks were fixed on the existing timber plank to make the foot comfortable. After restoring the roof of the building with new reefers and flat tiles, the props which fixed to transfer the load of upper floor were removed. Three decayed rafters in drumming hall roof were replaced, and restored the roof with new reefers and flat tiles.


Finally it was decided to display the removed original timber portions in the site museum.

After Restoration of the Monument

Principles and Techniques in Conserving and Restoring Wooden Architectural Heritage Sites in Viet Nam

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I. THE CHARACTERISTICS OF WOODEN ARCHITECTURE AND WOODEN ARCHITECTURAL HERITAGE IN VIETNAM

1. Overview on the wooden architectural heritage of Viet Nam

In Viet Nam, the architectural heritage consists of individual buildings and structural complexes; and population structures in the rural or urban areas which represent major developmental phases in the architectural history, outstanding architectural and artistic merits or other values.

Up to 2013, Viet Nam has recognized 7,000 heritage sites at provincial level, 3,196 at national level and especially 7 cultural and natural world heritage sites. The architectural heritage of Viet Nam provides us with not only tangible evidence of the national architectural development, but also a source of data for researches in history, ethnology, culture studies and arts, etc. As a result, the outstanding value of the Vietnamese architectural heritage is in and of its historically informative feature.

Since early 1960s, Viet Nam has begun to research and make great efforts to protect its national cultural heritage, with the establishment of a management mechanism in cultural heritage preservation from the central to local government. Currently, the preservation of cultural heritage including architectural heritage has become a matter of increasing interest for the government and all Vietnamese people. There have been considerable investments in preserving and promoting the value of the national architectural heritage.

Regarding the historical value, Vietnamese architectural heritage reveals direct and indirect information about the country's history. It is not only the remaining of architectural masterpieces from different periods of time, but also an important source of historical data for Viet Nam. Therefore, to preserve the architectural heritage is actually to preserve that source of historical data. The activity has a special meaning in the case of Viet Nam where historical data is relatively limited and other forms of cultural heritage were not conserved in great abundance. It is also the reason why having heritage sites stayed intact has become a strict requirement for restoration work in Viet Nam.

2. Typical features of wooden architecture and wooden architectural heritage of Viet Nam

2.1. In Viet Nam, except from several citadels and tombs, most of architectural structures were made of or mostly from wood. It was the popularity and long term use of wood that defined the architectural style of Viet Nam. The first notable feature is the consistency (in general) of architectural forms, structures and decoration techniques. Most of dissimilarities over time or across different styles could only be found in the details.

2.2. Typical structure of traditional wooden architecture in Viet Nam:

Architectural heritage accounts for 40% of the total number of recognized heritage sites in Vietnam, of which 80% are wooden structures. There are three basic elements of a wooden structure in Viet Nam: floor – main part – roof.

The main part is a wooden structure which consists of Cot (Column), Xa (Beam), Ke, Bay, Vi (primary wooden truss), Hoanh (Purlin), Thuong Luong, Rui (rafter), etc. These components are joined together by the mortise joint technique – a three dimensional fastening system.

The set of Vi is a reinforced formation that connects to and supports the roof in order to create a stable structure in which all parts are fastened together. It also sustains the tension strength and bending force, defines the internal space of the house, and serves as a decorative element which represents different prominent architectural styles in different periods of time.

2.3. Main attributes for wooden materials used in wooden structures and wooden architectural heritage in Viet Nam:

In the north of Viet Nam, ironwood (Lim) was used in most of old building structures such as palaces, communal houses, temples, pagodas or traditional houses. In the central region and the south, peck-wood (Kien Kien) was more popular. All the wood used in those heritage sites are heavy wood, with the weight/volume ranging from 0.6 to 1W. Theoretically, wood was treated and stored about a month before being used. In reality, when the humidity and temperature change, the wood would be moistened again. This is a special physical characteristic of ironwood (Lim) and peck-wood (Kien Kien) in Viet Nam. Furthermore, Vietnamese wood can transfer heat, which leads to the elasticity phenomenon. Even though the rate of elasticity is quite low, it often goes hand in hand with the moistening phenomenon which involves a sudden and uneven change in the volume of the wood leading to cracks or convexo-concave phenomenon.

Another disadvantage of Vietnamese wood is its natural defect caused by worms, fungi, or other defects resulted from the production process. Before the production process, many big old trees are split open. Over time, the cracks are widened due to the elasticity which creates chinks for moistening the wood. It is a hotbed for dangerous living creatures. The longer it takes, the wider and deeper the cracks dug inside the wood, which weakens the strength of the wood.

2.4. The variations of wooden architectural heritage in history:

There are three main reasons causing the alteration of a wooden architectural site: the decay of wooden materials, the impact from the surrounding environment and restoration work.

a. Firstly, the decay of the wooden material: In Viet Nam, good wooden materials have often been used for built structures, in spite of their inadequate durability. Among the existing wooden heritage sites, the oldest one dated back to the 16th century (Tay Dang and Thuy Phieu communal houses) while the others often aged about 200-300. From existing sites and assumptions about their ages, it could be suggested that the wooden structure of Vietnamese wooden architectural heritage has been around for about 500 years. It cannot be compared to the wooden heritage of other countries with temperate climate, and even among tropical countries and in Viet Nam, the age is quite rare.

b. The alteration of wooden structure due to environmental impacts such as mold and fungi, insects or social forces:
   - Impacts from the natural environment: Most of Vietnamese wooden architectural heritage sites are located in the lowland where sedimentation often results in depression in a large area. It is detrimental for the building structure in place. Reinforcement solutions such as a good appropriate foundation ought to be provided otherwise with a huge and uneven weight, the building would be sank or slanted and the supporting structure would be distorted, breaking the wooden materials.
   - Temperature is another cause for ruining wooden architecture heritage in Viet Nam. The average temperature is fairly high especially in summer:

Average temperature in Viet Nam (^{0}C)

Location	1	2	3	4	5	6	7	8	9	10	11	12	Average
Ha Noi	16,6	17,1	19,9	23,5	27,1	28,7	28,8	28,3	27,2	24,6	21,2	17,9	**23,4**
Hue	20,0	20,9	23,2	26,0	28,1	29,3	29,3	28,8	27,1	25,0	23,2	20,9	**25,2**
Ho Chi Minh	25,7	26,6	27,8	28,8	28,2	27,4	27,0	27,0	26,7	26,6	26,3	25,7	**27,0**

- The table shows that the temperature difference is as high as 12, 2 ^{o}C. Sudden changes or big differences in temperature between different months or seasons result in the deformation of wooden materials, particularly of small and thin pieces such as purlin or bulkhead. Moreover, when temperature rises by 10 ^{o}C, the chemical and other reactions speed up two times causing self-destruction inside the wood which results in cracks or convexo-concave phenomenon.
- The impact of humidity: Viet Nam often experiences high humidity especially in rainy seasons. Water vapor and temperature have direct impacts on the surface of wood leading to decomposition which reduces the durability of the wooden structure. In addition, high humidity provides good environment for the development of mold and harmful bacteria.

Average humidity in Viet Nam (%)

Location	1	2	3	4	5	6	7	8	9	10	11	12	Average
Ha Noi	80,0	84,0	88,0	87,0	83,0	83,0	83,0	85,0	85,0	81,0	81,0	81,0	**83,0**
Hue	90,5	90,3	88,6	84,5	80,1	76,4	73,6	77,0	84,9	88,2	88,9	90,3	**84,5**
Ho Chi Minh	73,8	71,1	71,0	73,7	80,7	83,7	84,2	84,5	86,0	85,2	81,7	77,8	**79,5**

Along with temperature change, high humidity is another factor leading to the constant alteration in the volume of wooden materials due to uneven deformation resulting from moisture absorbing and vaporizing. The main structure and other supporting components are made of or mostly from wood therefore the deformation means that the building would be slanted, wooden materials damaged or destroyed and mortise locks broken which is harmful for other parts such as columns and beams, etc. Temperature and humidity together form a tempt-humid correlation. The tempt-humid in Viet Nam falls around 1 (calculated according to the Grigoriep-Boduco formula). It is the best condition for the development of harmful vegetation and bacteria.

- The impact of rain: The average annual rainfall in Viet Nam is about 2,000mm. This precipitation is quite high and has become the main cause for the sinking of simple building foundations of many aged architectural heritage sites, particularly wooden ones. The whole building structure, consequently, is slanted resulting in serious damages in the wooden materials used for the site.

Average rainfall in Viet Nam (mm)

Location	1	2	3	4	5	6	7	8	9	10	11	12	Total
Ha Noi	18	25	46	84	192	240	290	310	258	125	47	20	**1665**
Hue	187	89	57	64	78	104	76	125	492	744	594	346	**2956**
Ho Chi Minh	2,5	0,5	5	29	193	204	213	179	214	218	73	25	**1357**

c. Impacts caused by the moldiness and bacteria's activity

Most of wooden architectural heritage sites in Viet Nam share common characteristics such as being used for a long period of time, surrounded by lakes, ponds and many trees, quiet inside, but having no ventilation system and limited amount of natural light. Combined with the high humidity, it creates such a favorable condition for mold, termite and worm. Among them, termite is the most harmful one though the development of any of the three would bring severe consequences to the wooden material. In Viet Nam, the supporting component that has often been attacked by termite is columns. After years of exposing to high humidity, the core part of the column, which is often soft, spongy, moisture-absorbed and likely to be cracked due to high rate of elasticity, could be eaten by termites.

High humidity, lack of sunshine and no ventilation system inside the building creates a hotbed for the development of mold and fungus. For the Vietnamese wooden structure, the negative impact of this factor is also substantial. In fact, the parasite of mold and fungi on wooden materials contributes to the moisturizing process. If the phenomenon prolongs, the wood cells could be decayed making the material soft and light, which reduces its sturdiness. Fungi and the decayed wood also attract termites. After fungi decompose the wood's lignin making it soft and eatable, termites consume the remained cellulose. The repeated mutual support between fungi and termites in a long time causes severe damages to the wooden structure. For important components such as columns, the negative impact of this factor is the main reason of the disappearance of the core part of wooden materials.

d. Restoration is another important explanation for major changes happening to the wooden architectural heritage of Viet Nam. There are two main types of changes for wooden architecture in the country: changes in architectural style and scale; and changes due to maintenance work.

In the first case, changes can be found in an individual structure or a complex of buildings. For example, in an old traditional communal house, its original plan was often in a rectangular shape (communal houses dated back to the 16th century). However, in later centuries, an additional harem might be built, which created the Dinh (a T-shaped Chinese character) shape for the overall space (communal houses dated back to 17th century onwards).

In the second case, changes resulted from restoration work when the formal building is under the threat of falling down and people start to repair and renovate it. There were two types of restoration:

- Repair based on making the best use of all components and the formal wooden materials by "mending, connecting and gluing together". The repair is not motivated by maintaining the site intact, but by saving costs. For example, if the foot of a wooden column is damaged, it will be cut out and replaced by a "good" piece of wood. The same technique is applied to any wooden part that is decayed or destroyed by termites or worms.
- Repair and replace the damaged wooden structure by similar materials or by other types of wood if the similar one is not available.

In the repair and restoration process, decisions used to be made based on principal purposes of strengthening the building structure, making it sturdier and more durable, but also costing less. If possible, people would like to renovate a building so that it looked more appealing and useful. The awareness about conservation was not raised.

With limited financial resources, repeated repair activities have saved wooden heritage sites from disappearing and kept the general form of the structure over time although naturally repair also means some certain extend of intervention.

At present, to preserve wooden architectural heritage in Viet Nam, the "mending, connecting and gluing together" technique has been inherited in maintaining the same house from older generations. However, the main difference lies in the fact that, in conservative restoration, a wooden architectural

heritage site does not change as it did in the past, but stay the same as it is at the time of being recognized as a heritage site.

II. PERSPECTIVES AND METHODS IN RESROTING WOODEN ARCHITECTURAL HERITAGE IN VIET NAM

1. Dating methods for wooden architectural heritage

From a conservation and restoration perspective, wooden architectural heritage sites in Viet Nam are often categorized by the following dating concepts:

- Construction date;

- Major date;

- Optimal date;

- Real date.

Construction date: Very few Vietnamese architectural heritage sites today are still kept in original structures and forms. Particularly, for wooden sites, most of the intact ones only date back to the Nguyen dynasty (the 18th century). For others, many were initially constructed in the Ly dynasty (the 11th century) or Tran - Le dynasties (from the 15th to 17th century) but their architectural styles could not be dated before the 18th century. Some even show the style of the 19th century. As a result, it should be taken into account that for wooden architectural heritage of Viet Nam, the age of a site based on its architectural style might not be the same as it is by counting from its construction date.

Major date: The concept "Major date" indicates a period of time in history when a heritage site was extensively repaired or renovated. Major date does not mean it has the most important value, but offers an accurate representation of main architectural characteristics and material advancements in a historical era when the site was renovated considerably. In some cases, the major date involves the most outstanding values of a specific heritage site. This issue has always been aware of and taken into consideration in all recent heritage restoration work in Viet Nam. It has also become an important point in developing an appropriate approach to the preservation of the wooden architectural heritage which normally underwent a large number of changes in history.

Optimal date: the issue of keeping a heritage site as in its "original condition" (not the current condition but an "original condition" that used to exist or that is assumed to exist) or removing and replacing certain things to make them better fit in the whole space of the site, has been raised in the field of heritage restoration in Viet Nam. However, in the current situation of wooden architectural heritage sites in Viet Nam where sources of data on this heritage form is still very limited, it is extremely difficult to restore, in a systematic way, an architectural style of a specific historical period or an accurate image of a heritage site at a specific time in history. Conservators do not have in hand necessary data and evidence so their work bases mostly on personal assumptions and judgments. One central theme in the restoration work for wooden architectural heritage in Viet Nam is to preserve independent historical witnesses over time. The optimal date is often not applied in the restoration work of wooden architectural heritage.

Real date: As mentioned above, one important feature of wooden architectural heritage sites in Viet Nam is that their ages based on analyzing the remaining wooden material or architectural style might not be the same as they are by counting from their known construction dates. Most wooden structures – wooden architectural heritage sites do not belong to one specific era. Each heritage site often possesses different elements representing different periods of time. Therefore, in restoring a wooden structure in Viet Nam, along with dating methods, it is also of high importance to pay attention to what have remained on the building over time and all the historical changes it has gone through. Such approach has been adopted widely in the current restoration work in Viet Nam.

2. Considering the set of criteria to preserve values of wooden architectural heritage during restoration process in Viet Nam

Age value: It is an important criterion. Viet Nam has quite a limited source of historical data, thus historical values of architectural heritage are critically important. Having considered natural disadvantages involving its durability, the remaining of any wooden structure, in spite of countless difficulties and challenges, is a valuable asset in terms of the authenticity and originality which are often very fragile for such heritage form. In order to preserve the distinctive character of the wooden architecture in Viet Nam, it is important to save as much as possible what can be saved on site, particularly the wooden material.

Architectural and artistic values: Architectural value is the most important criterion to rank architectural heritage sites. In order to be recognized as an architectural heritage, the structure has to meet the following criteria: heritage sites which represent a period of time in the national history; an architectural style; an architectural and spatial solution or a unique construction technique. The artistic value in wooden heritage sites in Viet Nam is on the art of wood carving and wooden sculpture with decorative patterns involving a great variety of folkloric themes. Based on these criteria, architectural and artistic values of wooden architectural heritage of Viet Nam are defined in the diversity and flexibility that emerge out of the overall consistency in the architectural and decorative style of each site. Besides, the set of criteria is applied appropriately according to specific cases of restoring and repairing specific part of each wooden architectural structure.

3. Considering the linkage between social demands for cultural heritage and its current situation from a restoration perspective

Spiritual demand: A large number of wooden architectural heritage sites are performing their original functions as they were built for in the first place. Communal houses, temples, pagodas, shrines, family chapels and traditional houses are all presently in use (the technical term in museum studies is living heritage). Heritage sites are operating and their original functions are kept. Therefore, certain conflicts between heritage conservation and development might be created, posing a considerable number of problems for heritage restoration work.

Although Vietnamese architectural heritages sites have been able to play their original roles, most of them could not be maintained intact and changes are inevitable, particularly for urban heritage. In restoring wooden architectural heritage, conservation has always been the first and utmost purpose for Viet Nam. Adaptation or renovation will only be considered as an option if it is unavoidable. For example, in restoring an old pagoda, old components which are of high architectural values will be preserved as carefully as possible. Others structures built more recently or with less important roles could be renovated inside in adapting to changes in the current situation. However, the key principle is to ensure the consistency in the main architectural style and not to bring inappropriate elements into the existing site.

In Viet Nam, it has been realized recently that in conserving wooden architectural heritage, most of which are spiritual and religious sites where a large number of people visit frequently for practicing their religions, a special management mechanism should be developed. It is to better protect architectural heritage sites, and at the same time, to serve spiritual and religious demands from the public.

III. BASIC PRINCIPLES, METHODS AND TECHNIQUES IN WOODEN ARCHITECTURE RESTORATION IN VIET NAM

1. Main issue on maintaining originality in wooden architecture restoration

Having examined and considered the nature of the wooden architectural heritage of Viet Nam, we have come up with some broad principles which are most feasible and appropriate for this kind of heritage asset of the country: ***Maintain as much as possible the main components and parts of architectural heritage sites and their existing features and values; the most important objective is to maintain the time value of architectural heritage sites as well as the consistency in all components as a whole structure; minimize any replacement or alteration; always keep in mind the overall objective of preserve the integrity of heritage sites.***

Some concepts and technical terms used in presenting the above mentioned principle are explained as follow:

- "Maintain" is used in the current situation where many people want to "remove this" and "repair that" to make heritage sites more durable. It shows the public that restoration is to save and to keep the originality of a heritage site.
- "Component", in this case, means all structural details of a wooden architectural structure such as columns, beams or decorative patterns, etc.
- "Part" is concerning specific spatial areas that shape the site as a whole
- "Time value" for architectural heritage site could be understood as the site's age which normally does not base on its construction date, but the age of specific components and parts which were constructed in different periods of time in history. Time value is what has been left over time on a heritage site and its architectural features such as a decorative pattern or the dated construction materials. It is very fragile and most likely to be forgotten or lost during restoration work or other intervention in wooden architectural heritage. If retained, it will contribute considerably to the "originality" of the restored wooden architecture.
- "The consistency in all components as a whole structure" reflects a special feature of Vietnamese wooden architectural heritage. The term is used with reference to the fact that different components and parts of a wooden architectural heritage site were constructed in different period of time in history. The consistency of the whole structure can be achieved when any replacement had an appropriate reason, for example, at a certain time, if it had not be done, the whole structure would have collapsed. The nature of wooden architecture mainly involves putting different wooden pieces together by mortise joint technique hence if necessary one separate piece could be replaced at a time. Replacement mostly concerned reinforced structure, not the interior decoration, therefore the architectural style of the site was not normally affected. The consistency of the whole architectural structure is the representation of its long history, and an important value that Vietnamese professionals in the field of heritage restoration and conservation always pay attention to and try their best to maintain (minimize any alteration and replacement).

Main features contributing to restoration methods for wooden architectural heritage sites in Viet Nam:

- Wooden materials cannot last permanently. In the Vietnamese climate, most of them can last no longer than three hundred years. Replacement of damaged parts is unavoidable in order to keep the building from collapsing. It can be considered as natural replacement for the purpose of continuation.
- Wooden architectural structure is built by putting together separate components such as columns, beams and set of Vi, etc. With the mortise joint technique, it can be dismounted quite easily. Due to strong impacts from the natural environment such as storms, the main structure could be deformed leading to the deformation of the whole building. It is the second feature of Vietnamese wooden architectural heritage: the main structure might have to be taken out for the purpose of repairing and restoring.
- Evidence of partial replacement on separate components and the existence of different components which were constructed in different periods of time in one architectural structure could be found in most of Vietnamese wooden heritage sites. As a result, replacement is inevitable for wooden architectural structure due to the nature of the wooden material.

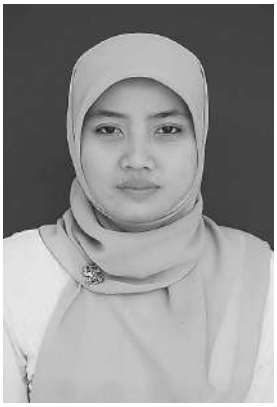
2. Some practical solutions for heritage restoration in Viet Nam

A solution that combines traditional restoration methods and modern techniques and principles has been applied for wooden architectural heritage sites in Viet Nam, specifically:

- *First:* Maintain original components and features that have been developed for a site overtime.

- *Second:* Restoration is considered as a holistic solution which is most appropriate for specific sites. It is a continuation of what older generations has given us, in order to sustain heritage sites. Restoration is also to make a site more stable and durable (restore the foundation or the main structure); to fix damaged wooden parts by mending, connecting and gluing techniques; to maintain as much as possible artistic decorative patterns such as wood carvings or sculptures; minimize replacements and alterations, and when unavoidable, find the same or similar type of wooden materials and duplicate exact sizes and forms as those of replaced pieces.

With the above mentioned principles, the restoration work for wooden architectural heritage in Viet Nam has made considerable achievements, save many old wooden structures from the risk of collapsing, attract tourists and contribute to the socio-economic development of Viet Nam.



Conservation of Traditional Wooden House (*Joglo*) at Kotagede, Yogyakarta, Indonesia

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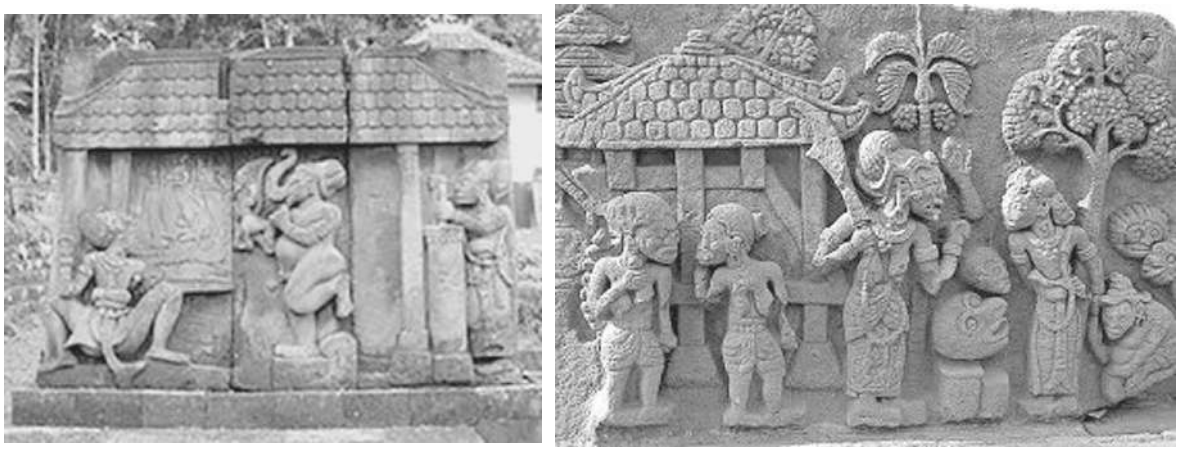
A. *Joglo*

Indonesia is an archipelagic country located in Southeast Asia. It has a tropical climate. Indonesian society composed of various ethnic groups that have diverse backgrounds of different cultures. One of the largest ethnic groups is Javanese whose majority is settled in Java Island. They established the unique community and civilization that settle some traditional heritage including in the field of architecture. *Joglo* is a Javanese traditional house, which is still well-preserved for generations until today. Traditional house has been there since the Javanese ancestors lived there a long time ago. This is proved by the reliefs existing in Candi Sukuh built in the 15th century.



Relief of traditional house in Sukuh Temple

Joglo is one of the traditional houses from the Javanese ethnic group. The uniqueness of this house is seen in the construction of the house itself, the philosophy and the history contained values adopted by the Java community. In a structured Javanese society and tradition, *Joglo* also reflects Javanese social status; this type of building is only reserved for palace (*keraton*), official residence, government estate, and the house of nobles (*ningrat*). Originally commoners were not allowed to construct this kind of house as their residence. Construction of *Joglo* has certain procedures / rules in the preparation stage, the selection of building materials, the selection of a good time for building, and ceremonies that accompany with some stages of the development, such as the installation of certain parts of the house, and also the ceremony at the starting and the finishing stage of making *Joglo*.

B. Philosophy *Joglo*

House of *Joglo* in Javanese called '*Omah Joglo*' is a house with a simple basic form. Simple itself is an expression of the simplicity of Javanese community. In terms of architecture, the art of architecture is not just an understanding of the art of house construction, but it is also a reflection of the values and norms of the people of Java. Human love of the sense of beauty, even the religious attitude is reflected in the architecture of the house with this style.

That philosophy ultimately affects the shape and the structure of the house of *Joglo*. The characteristic of *Joglo* home design is the main building design which consists of four main pillars–*called Soko Guru* and the intercropping in the form of beams placed on the *Soko Guru*. The interior design of *Joglo* home design consists of three parts of the rooms. The front part is the room *called Pendapa*, the meeting room; the middle part is the room called *Pringgitan*, the room to hold a puppet show; and the back part is called *Dalem* or *Omah Jero*, the family room which also consists of three rooms (bedrooms) named the left room, central room, and the right room. The description of the three spaces is as shown in the slides namely *Pendopo* (the front space), *Pringgitan* (the middle space), *Omah Njero* (the back space) and *Gandhok*.

C. The uniqueness of *Joglo*

1. Material of *Joglo*

Joglo was able to survive for hundreds of years. This is affected by several factors: the selection of the type of wood, logging methods, and logging time. The selected types of wood are trees that were widely available at that time, namely teak tree (*Tectona grandis*), and the trees were mostly grown in tropical areas. Teak trees are categorized as a good tree because they have a large size of perimeter, straight-trunked, and few branches.

Example of carving from teak wood

Best teak trees are generally older than 80 years old. Teak wood is a first class wood with strength, durability, beautiful fiber. And it is easy to work with, and they are not easily damaged by the weather changes and they are resistant to termite attack. Teak wood contains a kind of oil

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and sediment in the cells of the wood, so it can survive in the open climate. For this reason, teak wood is used also as a docking port, rail pads, bridge, commercial vessels, and warships.

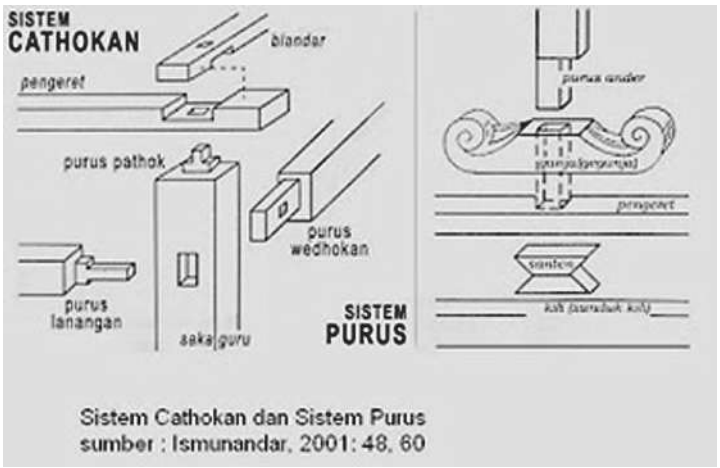
As for logging process, there are a couple of factors to consider in the better process as in the slide. Please see your handout for the detail.

a. Age of the tree that are ready for cutting
   Young trees have not reached the optimum point for cutting, in addition to the nutritional content of the wood for the process of tree growth is still very high, so the quality of the resulting wood is more susceptible to be attacked by insects and fungi and destroyed by other natural factors
b. Period/time logging
   Period/time or logging season will be determined by the quality of the wood that will be produced. Trees with the leaves fallen at the end of the dry season would be well suited because the trees would have a low nutritional content, compared to the trees with leaves fallen in the rainy season, so that the resulting wood is not susceptible to insects, fungi and other destructive factors.
c. How to logging
   Before the teak tree is cut down, the bark of the bottom part needs to be peeled. With peeling the bark to the cambium layer under the section, then the roots are no longer active to send nutrients to the tree trunk, while the backup of nutrients contained in the trunk of the tree will be absorbed by trees' metabolic processes to sustain life to a minimum and eventually die and dry out in the plots of land. So when the trees are cut, the nutrient content in the wood is only slight.

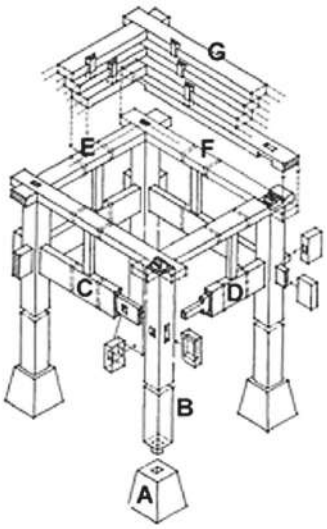
2. Construction

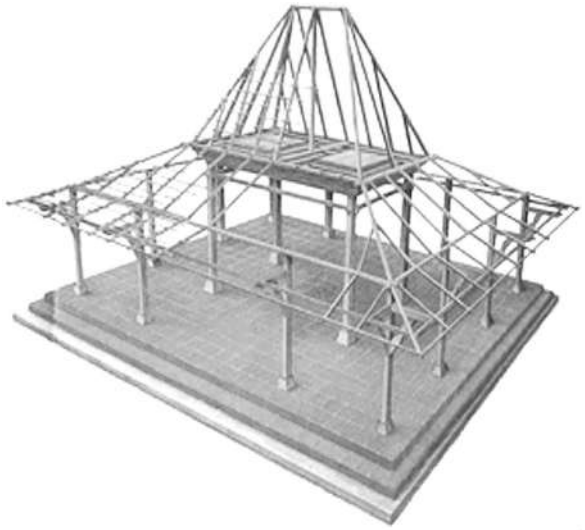
Joglo house is made with the ideas in there to make the building that can be adaptable to the earthquake. Structure of *Joglo* applies tent or pull system. Timber connection system is used (*cathokan* and *ekor burung*), and all of it is due to anticipating the pull.

The distribution system of load in *Joglo* is charged at 4 pillar (main mast) and 12 pieces of a cornerstone accompaniment. Fundamental pillars are united by beams (*blandar-pengeret dan sunduk-kili*) and are arranged so that the wood punden shaped can be inverted (*tumpangsari*) and pyramid-shaped in the middle (*brunjung*). The composition of the wood and created rigidity flops are very rigid.



Sistem Cathokan dan Sistem Purus
sumber : Ismunandar, 2001: 48, 60

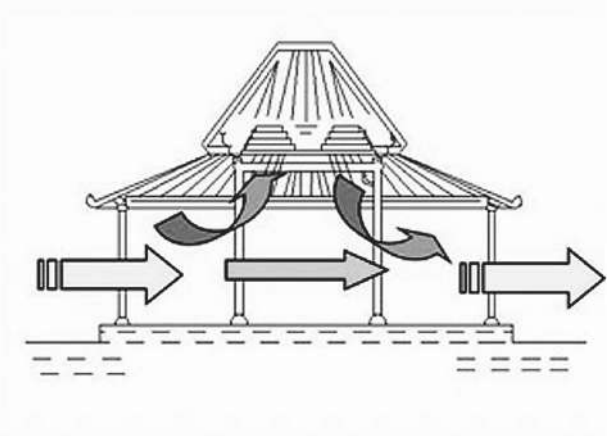


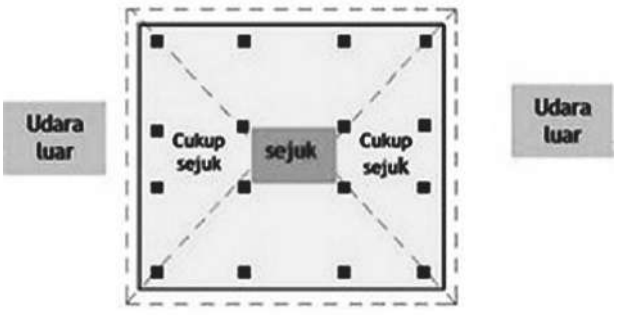


Meanwhile, on the pedestal system of *Joglo*, using a system that is extolled joints/*umpak*. This is to compensate for the behavior of the structure that are flops/rigid. Configuration of the joint at the bottom and at the top flops make *Joglo* can be swaying. The use of wood for wall (*gebyok*) and clay tile for the roof make the structure lightweight, so it is relatively not overload for building.

3. Ventilation System

Natural ventilation in traditional buildings in tropical climate is useful to reach thermal comfort. Natural ventilation system is designed on the roof element of *Joglo* to produce the indoor comfort in hot humid tropical climate. Ventilation on *Joglo* is designed to adjust to the tropical environment, which keeps it comfortable for occupants. The models of roof on the *Joglo* have terraced shape, and each height level of the roof describes the movement of people into the *Joglo* with air that they feel. When people are on the edge of *Joglo*, the man can still sense the air from the outside. But as more people move to the center, the air that they feel becomes cooler. This is because the volume of space under the roof, with the middle part being bigger (Theory in physics building). When people want to go back out, the air is again changed, for the air from outdoors feels cool. So ventilation on Joglo is attentive to the human body adjustments on the weather around it. Furthermore, natural material for roof framework and roof cover serves as excellent insulators for absorbing heat during the day, and releasing the heat at night.





D. Traditional Conservation as Local Wisdom for *Joglo* in Kotagede

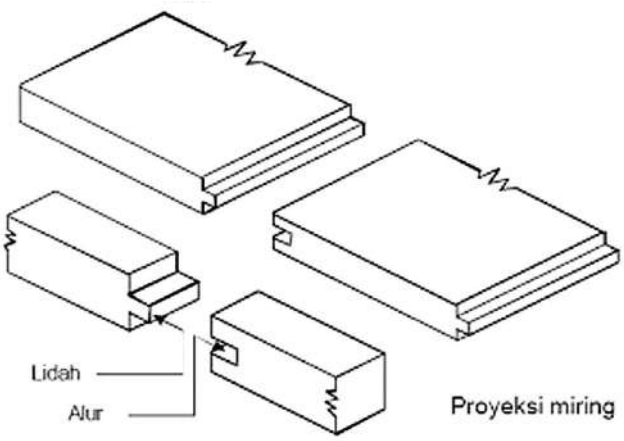
The Kotagede Heritage District was the fifteenth- to sixteenth-century capital of the Islamic Mataram Kingdom in Indonesia. Its plan was based on that of an ideal Javanese city, which includes "four components in one"—a palace, mosque, market, and public square. Today, only the mosque and the still-thriving market survive. These are surrounded by traditional Indonesian houses. So, the traditional house "*Joglo*" in Kotagede became heritage now and need to be preserved.

Local wisdom in *Joglo* for Conservation

In order to preserve the traditional buildings, it requires some methods to maintain, repair, and restore them. Conservation with chemicals is commonly used for preservation and improvement of materials and artifacts/components of building. But the disadvantage of conservation with these chemicals is that it wouldn't give eco-friendly effects and rather gives bad effects in the long term. Therefore traditional method is alternative for conserving with eco- friendly method. The traditional method for conservation requires knowledge from ancestors. Traditional treatments/cleaning on the wooden surface are still done until now, using water soaking formula (tobacco, cloves, and banana stem). Furthermore, the layout of each part of the *Joglo* is also of traditional preservation, too.

Tobaccos (*Nicotiana tabacum*) as insecticide for termite contol, based on several studies, have proven that their leaves have the effect to reduce appetite of insects, and that it can inhibit insect development. Clove (Syzygium aromaticum) contains flavonoids, terpenoids and phenolic compounds, that are anti-microbial and insecticide.

Joglo can reduce the damage of earthquake, because it has a traditional type of connection between structure and the material. The connections between beams and wooden parts are not rigid, but rather flexible so that they have a high tolerance for the earthquake. Connection does not employ nail system, but using the system "*alur- lidah*", it produces tolerance with movement while working on the wooden beams. This tolerance causes friction, so the building can be accommodative to receive seismic forces. The *Joglo* connections can be dismantled and reassembled without damage to each component, so the components of *Joglo* can easily be repaired. Each connection has a sign, so it can avoid mistakes when reassembled. In the process to make a traditional house, building wooden components needs skilled craftsman in carpentry (carpenter). Wood cannot be processed by people who are not experts, because the results will not be good.



The "*Alur Lidah*" Connection

E. Preservation for *Joglo* in Kotagede

Preservation for heritage was done according to the regulation. It was required to conduct a study of feasibility to get data for damage, structure, material, design, architecture and significance/value. Then they did the analysis of data, and determined treatment recommendations for it. (Dismantling or just conservation)

a. Stages of Dismantling

1. Wreck of building
   Technical principles that must be followed is the numbering each element of the building that are dismantled for registration (marking or code), so that there will be no trouble when reassembling.
2. Conservation
   In this step, activities have to be done after each component of the building is finished with the registration. Conservation activities are cleaning, conserving, restoring and preserving.
3. Reassembling
   After all component of the building is finished for conservation, each component will be reassembled according to the proper code in each of the part.
4. Documentation before, during and after dismantling activities
   Documentation is very important to record all of activities from the beginning to the end.

b. Conservation in *Joglo*

1. Mechanic cleaning with traditional method

Traditional method uses water soaking formula for cleaning surface of wood. The water soaking formula consists of three components, that are clove, tobacco and banana stem with specific proportion.

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Clove

Tobacco

Banana stem

Traditional treatments/cleaning for wooden surface with many kind of material are water soaking formula (tobacco, cloves, and banana stem). Water soaking formula consists of 10 grams of tobacco, plus 10 grams of cloves, and 10 grams of banana stem put into 1 liter of water and waited for 24 hours. Cleaning method for wooden surface is done by applying the formula that is ready for use. With that, they polish it using a cloth repeatedly until the wood surface becomes dry.

Pure water

Water soaking

The different result between traditional water soaking and only pure water

Polish the wood with the water soaking

2. Restoration

a. Replacement and partial replacement

Replacement of the wood is done if there is a component that has been categorized as damaged wood and also if the wood has an important function in the structure of the building (building support). New wood for replacement material should have the same specifications as the original wood. So for the reason, some research must be done to determine the specifications of the new wood. But sometime, in the different case wood does not need to be replaced but quite simply be connected with the new wood. The connection

The connection

will be done when approximately thirty percent of the wood is damaged. Also the new wood must have the same specification with the original wood.

b. Act of patching

Patching can be done by using wood or wood powder, depending on the extent of damage, the condition of the wood, and the function of the wood in the structure. Patching can be done with wood/wood powder that has the same specification to the original wood.

Patching with wood

Patching with wood

Patching with wood powder

3. Treatment

Treatment is a very necessary stage to protect wood from termite attack. Treatment can be done in two ways, the first way with injecting water soaking in the small crack or the hole in the wood and the second one is by applying it with a brush on the wood surface.

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Building maintenance is also done with care for the environment around the building, among others, to prevent termite attack, prevent the entry of pests, while also maintaining the drainage system in order to stay well.

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The Practice of Wooden Conservation in Bhutan

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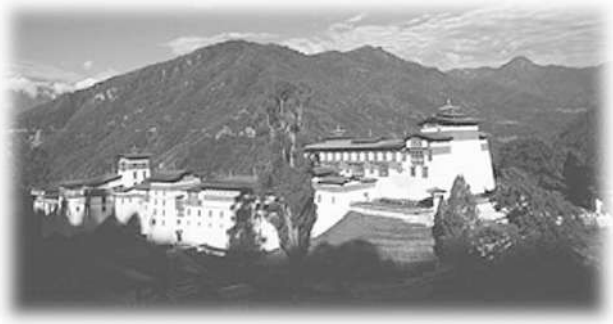
Heritage sites of Bhutan; a Brief Outlook

As we look into the history of Bhutan, culture played an integral part in Bhutan's sovereignty, unity and identity, though placed in the vulnerable geographical location, sandwiched between China to the North and India to the south. Bhutan is sometimes known to outside world as a last Shangri-La because of its enormous effort to preserve culture and natural environment. The old living traditions thrive in rural areas, which evoke the sense of "medieval ambience" to the foreigners. The tangible and intangible cultural identity is preserved from generation to generation. After the noble and visionary philosophy of Gross National Happiness[1] propagated by the fourth king of Bhutan, preservation and promotion of culture became the forefront initiation and is one of the four pillars in Gross National Happiness philosophy.

Heritage sites are one of the core elements in the Culture. From the monumental *dzong(s)*[2] to the small water mills, Bhutan houses ranges of heritage sites. Bhutan houses more than 2000 temples which are vibrantly alive and more than ten thousand *choeten(s)*[3] over its total area of 38,394 sq. kilometers. The heritage sites played vital role in the process of unification of country and flourishing of the Buddhism as early as seventh century in Bhutan. The *dzong(s)* built in seventeenth century brought a unique living tradition, with harmonious balance between secular and religion. The *dzong(s)* still serve the same purpose, accommodating the political, religious and logistic functions. Apart from that, the *dzong(s)* are also the focal areas of communal festivals, rituals and offerings, and plays as a tangible aspect in fostering the conservation and promotion of intangible heritage like dances and music.



Heritage sites in Bhutan are not perceived only from the material culture point of view. It is beyond the material remains, and is the central of unique traditions which provides cultural identity,

[1] A noble philosophy propagated by fourth King of Bhutan, Jigme Singye Wangchuk, Gross National Happiness philosophy is the guiding development philosophy which focuses on rational and human approach development.
[2] Built to house both administrative and religious sections, the dzong are the monumental structure of high historical importance in Bhutan.
[3] Buddhist stupa

unity and continuity. Marc Dujardin[4] stresses in his essay about the *dzong(s)*,

" In Bhutan, however, both the term fortress and the shape that is usually associated with it, are not only evocative of the nation's feudal and heroic past, but still play an active role in the country's quest for cultural uniqueness and national identity, exteriorized in material culture".

Division for Conservation of Heritage Sites; Agency for the Preservation of Heritage Sites

To address to the lost of the material culture and to preserve it, the Royal Government of Bhutan founded the Special Commission for Cultural Affairs in 1985. The commission was responsible for the conservation of both tangible and intangible heritage. Later the Commission was dissolved into Department of Culture under Ministry of Home Affairs. It was than the Division of Conservation of Heritage Sites was formed, focusing in the protection of immovable cultural properties in the country. Following are some of the main functions of the Division for Conservation of heritage Sites;

- Formulation of plans and policies related to conservation of heritage sites.
- Establishment of guidelines for the conservation of heritage sites.
- National inventory of heritage structures and sites of the country.

There are no legal documents for the protection of the heritage sites and hence the DCHS office has taken the task of drafting of the Heritage Act, which will be endorsed in 2014 parliament. The DCHS office also undertakes major projects for restoration of the important heritage sites.

Conservation philosophy in Bhutan

No written documents are available to be witness to the conservation philosophy, which existed in the history of architecture in Bhutan. There are little documentations and scientific studies carried out on heritage sites by the western trained minds but it does not completely justifies the vast architectural ingenuity passed on from generation to generation. The "architect" profession is very contemporary in the architecture scenario. It was only in late twenty first century, that the professionals emerged in the architecture ambience. In the past, and still thriving in some of the constructions, the craftsmanship of the unique architecture is passed on from the master craftsman to the workers below him. It is in this intangible face that retains and gives the character to the tangible heritage, including heritage sites. The hierarchy of workmanship makes this knowledge transfer authentic and the cultural continuity is retained.

If the universal concept of conservation and preservation is to be referred and relate to study the history of traditional conservation in Bhutan, the word "conservation" stands feebly and vague. As Marc Dujardin in his essay "from living to propelling monument: the Monsatery-Fortress (dzong) as vehicle of cultural transfer in contemporary Bhutan" asserts;

[4] Department of Architecture, Hogeschool voor Wetenschap en Kunst, Gent-Brussels, Associate member of the ESA 8047, CNRS-Paris.

"However, it is certainly not the western-like veneration of old buildings, historical monuments and even ruins, nor the demand for preservation that lies at the basis of the endurance of this peculiar concept in contemporary Bhutan. Bhutanese dwelling culture has no tradition of architectural preservation like the way it emerged and developed in Western Europe as a movement from the 19th century onwards."

As I mentioned in the brief description of heritage sites, most of the heritage sites are living and are susceptible to changes. I will be discussing the detail alteration done periodically of Punakha Dzong in the last part of my essay. In general, the heritage sites are periodically reconstructed either to retain or serve the intangible character associated with them or to make them "grander" for the religious or socio-political motive.

The opening of Bhutan from its self-imposed isolation in the reign of the third Monarch of Bhutan has let the rapid and sudden inflow of ideas from the Western World. The Western conservation philosophy was first introduced to Bhutan with the invitation of foreign experts. The preservation methods and strategies were experimented in the renovations of Punakha dzong in mid 1980s. This introduction brought contradiction with the existing conservation philosophy. However, it was clearly shown in Punakha dzong project that the Bhutanese stood in their decision concerning the important heritage sites. The Division for Conservation of Heritage Sites which is solely responsible for the preservation of heritage sites has enormous task to balance the pre-existing methods of preservation with the western centered approach.

The materials used in the heritage sites are wood, stones and rammed earth. The wooden members in the heritage sites are mostly susceptible to the change. If there are no major damages and the renovation works are not to increase the size of the building, the structural walls either of stone or rammed earth (sometimes adobe bricks) or both left unaltered. I will discuss the alteration of wooden members in my later part of the essay.

Heritage Concept and Buddhism

The association of Buddhism and heritage sites goes long way in the past, as early as to the oldest heritage sites of Bhutan. It was in the middle of the seventh century where two famous temples of Jampa Lhakhang and Kyichu Lhakhang are acclaimed to be founded by the famous Tibetan king named Songtsen Gompo to subdue the demoness. It is acclaimed that he built 108 temples and 12 were for pinning down the demoness, from which 10 is in Tibet autonomous region (China). Later in the middle of eighth century Guru Padmasambava who is considered as second Buddha in Tibetan Buddhism founded many sacred sites in Bhutan. Zhabdrung Ngawang Namgyel, considered as the founder of Bhutan built many historical sites, including monastery-fortresses in seventeenth century.

As we know that the Buddhism is rooted in the heritage sites, the perspective in which heritage sites are perceived is also from the Buddhist point of view. The Buddhist doctrine propagates the impermanent character to all modes of existence. Hence the material culture is inevitable to alteration and alike all forms of existence, the architectural creation too is subjected to change. It is also believed that physical or spiritual offerings in endeavor to "preserve" heritage can bring merit to oneself and to the sentient beings. The word "preserve" here is from Bhutanese perspective, which involves betterment of the heritage sites, resulting in embellishment and change. The efforts taken to make the Buddhist heritage sites "grander" gives merit and this is contradictory to the western concept of heritage preservation.

Most of the Buddhist heritage sites are living and hence in the passage of time, the need and functions they were originally designed to serve changes and the increase in the number of user results in addition to the original structure or sometimes reconstruction.

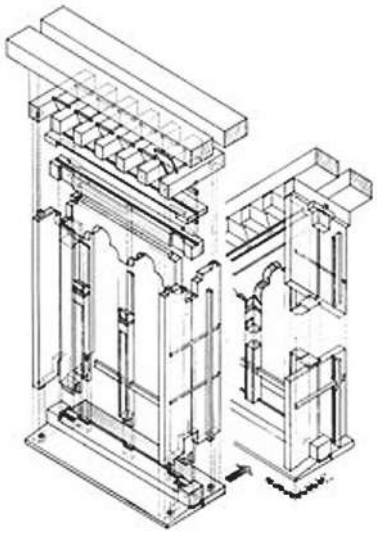
Wooden Conservation; the past and contemporary

Not belittling the craftsmanship of Bhutan's stone dressers and pise' builders, it is the high standard of Bhutan's prefabricated timber architecture that plays an important role to express in material culture Bhutan's sense of national identity and quest for cultural uniqueness.

Marc Dujardin, "From living to propelling monument: the Monastery-Fortress (dzongs) as Vehicle of Cultural Transfer in Contemporary Bhutan."

Bhutan's architectural quest for uniqueness is expressed in the wooden elements in the building. The wooden elements include doors and windows, interior structural pillars and bracket complex, roof and flooring. The staircases in almost all of the heritage sites are wooden and the altars to house the statues are beautifully crafted timber, which are painted exclusively and in minute detail. The survey conducted by the Department of cultural properties, ACA Japan from 1992-2002 relates the wooden members in the heritage sites of Bhutan to the Tibetan architecture. The major difference in the wooden elements between Tibetan architecture and Bhutanese architecture is the wooden members in Bhutan are intricately designed and abundantly used, the reason being the easily and abundantly available timber in Bhutan.

The uniqueness of Bhutan's timber architecture is in its construction method- *nailless* architecture. The timber members are fabricated without using any nails. This is made possible by joinery in the timber fabrication. This ingenious method of nailless architecture is advantageous also in the requirement of skilled labours in the construction. The number of skilled labours required is less since the fabrication is done in the carpentry shed. Hence more unskilled labours are used for installation in the building. The architectural order, the *thobthang* as Bhutanese call, in the timber construction have evolved during the course of history. The windows which were placed in the structural walls have changed with the introduction of the bay windows, probably after seventeenth century, which Bhutanese call *rabsey*. The rabsey is the cantilevered windows and have also undergone change in due course of time.



The consideration of wooden elements as the most expressive part of the heritage sites has not put its stand to be conserved in the traditional conservation methods of Bhutan. The wooden elements are the most altered part of the heritage sites. This is due to the material character to rot and its vulnerability in disasters like fire. However, the renovation does not respect the original form and is treated as the platform to make the structure grand, which I discussed in the earlier part of my essay. The wooden parts

in the heritage sites of Bhutan are in constant evolution, which people consider as the quest of cultural and architectural identity. But the newer forms in replacement to the earlier ones results in the lost of earlier ones and eradication of the material history of the building.

Although the change in the timber forms is constant, the traditional methods of construction are retained, except of the measurement system, in the present conservation methods. The construction before were undertaken with the measurement system based on the human proportions. The length of the arm was one such measurement system used in the earlier construction. Now with the introduction of modern measurement system, almost all the carpenters use it. The commonly used system of measurement is the feet and inches system. This results in becoming one factors of standardization of the wooden elements and the lost of diversity in it. There is also threat of the modern machineries in the restoration of heritage sites. The use of it will completely eradicate the intangible values associated with the wooden structures. This threat is addressed and the people responsible have taken initiation to protect such loss in the heritage sites.

Restoring Punakha Dzong (1984-2004) - a case in practice

Punakha Dzong, which is also known by name Punthang Dechen Phodrang[5] is situated in southern part of Punakha district[6] and serve as the seat for district monk body and district administration. The valley where the dzong is located is wider comparing with most of the valleys of Bhutan and the dzong stands in the confluence of two rivers, Phochu and Mochu. The dzong was built in 1637 by the founder of Bhutan, Zhabdrung Ngawang Namgyel. Punakha was the first capital of Bhutan and the Dzong served as the centre of government. The first session of the National Assembly was also held in the Dzong in 1953. The Dzong served as the seat of government until the reign of the second king.

As seen in the most of the history of Heritage sites of Bhutan, Punakha Dzong has suffered six major fires and five floods. Very little is known about the changes after the major disasters except of the fire of February of 1986. I will be discussing the works undertaken in restoration project from 1986 to 2006 and the concept of preservation incorporated in the restoration works.

The sketch of Samuel Davis in 1783 of Punakha dzong shows that the windows in the dzong were placed inside the wall and were not projected out. It is only in the photograph taken by John Claude White in 1905 that the major change in the wooden components in the dzong is observed from the dzong's state in 1783. The comparative photographs below show the changes to the dzongs from 1783 to the present time.

Samuel Davis sketch of 1783

Comparative photo taken in November, 2013

[5] The palace of great bliss

[6] Punakha district is located to the north-eastern side of Thimphu. It was the capital of Bhutan until 1955.

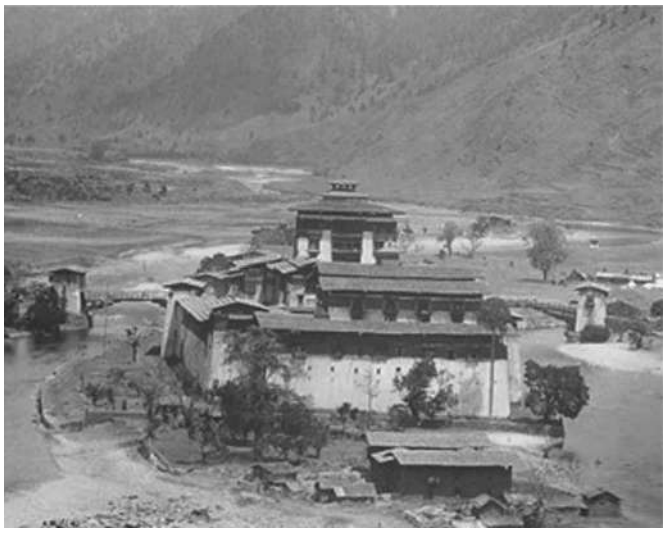


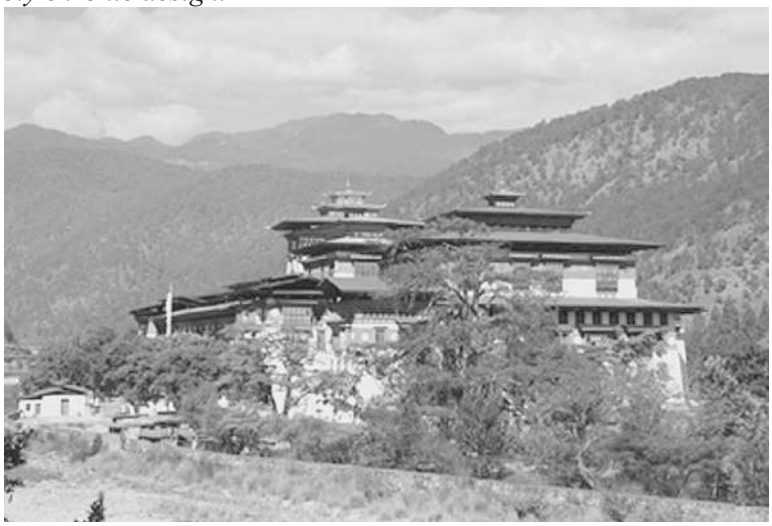
Photo snapped by John Claude White in 1905

The restoration project was started in 1986 after the fire burnt down the south-west section of the dzong where the Chief Abbot's residence is located. The renovation work was commanded by the fourth King of Bhutan and with this the reconstruction of Machen Lhakhang, the Kuenrey (Congregation hall) and the Dzongchung was started. The first phase of project was the reconstruction of Machen Lhakhang where the sacred body remains of Zhabdrung is preserved. For the reconstructions, the best carpenters were recruited from all over the country. The reconstruction brought complete change from the existing structure. The façade design altered completely and was abruptly influenced by the earlier construction of Kurje Lhakhang in Bumthang.

The observation put up in the "report of the cooperation project on the conservation of historic buildings in Bhutan" conducted by Department of Cultural Properties from 1992 to 2002 clearly states the nature of wooden preservation undertaken in the reconstruction of Machen Lhakhang.

" The columns currently being worked out at Punakha Dzong are decorated from top to bottom, with a lot of decorative work added on and the design was totally changed. However, from the aspect of the traditional value of cultural properties, traditional techniques of sculpture have been maintained there, and it is also necessary to retain the old poly chronic design."

The impressive completion of Machen Lhakhang attracted the introduction of contemporary building materials in Bhutan such as cement concrete and new techniques of concrete casting of the frescoes and sculptures were initiated. The second reconstruction was Kuenrey, congregation hall, known to Bhutanese as hundred pillars building. The building was reconstructed from the base and with this lost all the material culture of the existing building. The major flood in 1994 destroyed the structure near the main entrance of the dzong, Dzongchung, and the restoration project also included the re-erection of it.



Comparative photo taken in November 2013

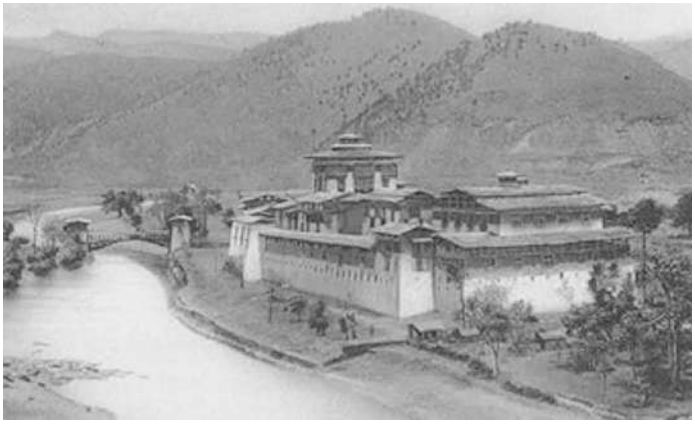
The roofing of the previous Kuenrey was gable with wooden shingles, but the new reconstruction was done in hip roof with the CGI roofing. The earlier design of the timber façade were simpler with less carving with the decorations painted on it, but the reconstructed timber façade has intricated and very detailed carving, which makes the structure "grander."

Marc Dujardin puts up precisely in his essay "from living to propelling monuments: the Monastery-fortress (Dzong) as vehicle of cultural transfer in contemporary Bhutan,"

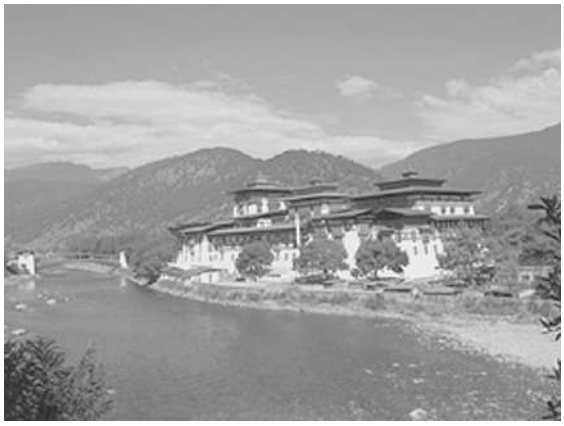
"From western 'conservationist' point of view and 'monumentalist' attitude towards issues of cultural and architectural preservation, the complete demolition and reconstruction of the old Machen Lhakhang

and Kuenrey, seems nothing but the erasure of a whole historical chapter. For the Bhutanese, however, the re-erection of the new Machen Lhakhang, Kunre and Dzongchung, seems to confirm the 'impermanent' status of architecture on the one hand; on the other it may be viewed as a 'built' sign of protection marking a new phase in furthering the country's quest for national identity and cultural explication, expressed in material culture."

The reconstruction initiated in Punakha dzong spread rapid waves of similar trend across the country. The wooden elements were replaced, in what Bhutanese feels the regeneration of cultural identity. In this process many material culture are erased or altered. This change, which is not new in the conservation methods of Bhutan, can be viewed from two sides of coin. The lost of material culture along with rich historical information is rather contradictory of the western concept of preservation. On the other hand, the renewal of the identity strengthens the functions in it.



Picture taken by John Claude White in 1905



Comparative photo taken in November 2013

The front rabsey of Utse before renovation of 1986-2006 (left)
The present rabsey after the renovation (right)

The way forward…

The restoration project of Punakha dzong was undertaken when the western conservation ideas were minimal and at very initial stage of its flow into Bhutan. Traditional method of construction or restoration does not have the trend of documentation and inventory. Bhutan has come long way after it. The DCHS office has undertaken the inventory and documentation of heritage sites. Modern concept of restoration is being executed in some of the heritage sites. The balance between the traditional conservation methods and the contemporary ideas has been brought, and the living heritage is sustained without compromising the authentic values associated with the heritage sites. It is of enormous challenge to instil the values of material culture in the minds of general public and the DCHS office has undertaken many awareness campaigns. It is unfair to the living heritage sites to be viewed to be as fossilized monuments or sites. It should be observed on the outlook of authentic change, so as to also emphasize on the sustenance of functions in it.

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Trends in the Restoration of Architectural Monuments in Japan — With Reference to the Restoration of Gansenji Temple Main Hall —

Ken-ichi FUJIKURA
Technical Staff
Japanese Association for Conservation
of Architectural Monuments (JACAM)

1. Architectural monuments in Japan today

Recent years have seen a change in the way architectural monuments are treated in Japan. In the past, they were predominantly viewed as "treasures" to be preserved. More recently, there has been greater emphasis on their functions as buildings and on actively using them, while making their value known to the general public. Background factors for this change include the increased number of architectural monuments as well as their categories (including not only temples and shrines, but also residential buildings, public facilities and factories), and the public roles that publicly owned monuments are expected to play. In addition, the different situations of different buildings account for various modes of use.

In my personal view, when architectural monuments are preserved in a manner that also encourages their active use and communication of their value, it is important to ensure the following for their users:

A. Safety
B. Ease of use
C. Special measures to effectively communicate the value of the monument

2. Trends in the restoration of architectural monuments

In parallel with the change in the way architectural monuments are viewed and preserved, restoration methods have also been changing. In addition to using traditional methods of preservation passed down from olden times, it is becoming necessary to use new technologies for preservation that allow active use and communicate value. In this presentation, I would like to describe the recent restoration of Gansenji Temple Main Hall as an example in which, to fulfill the three requirements for users, the following new technologies were used:

a. Seismic reinforcement
b. Technology for more active use (illumination)
c. Technology for preserving colors lost during restoration

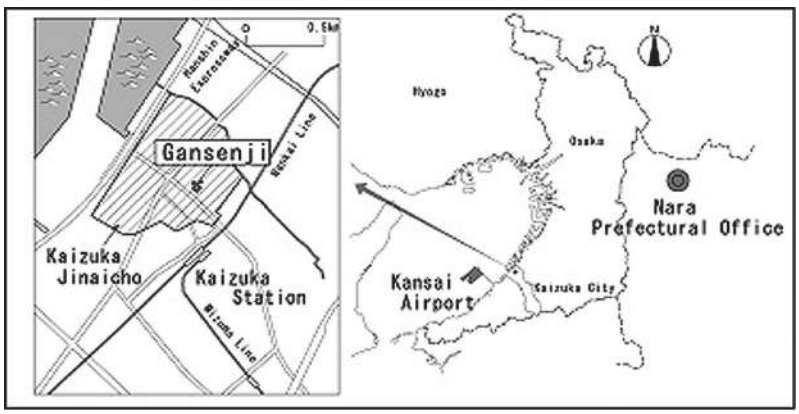


Fig. 1 Gansenji Temple: Location

3. Gansenji Temple Main Hall: its characteristics and restoration

Gansenji Temple

Gansenji Temple is a Buddhist temple of the Jodoshin sect, located in Kaizuka City in the southwestern part of Osaka Prefecture. It is believed to have been established in the second half of the Muromachi period, or 1392-1573. In 1583, Kennyo, the head priest of the Jodoshin sect at that time, arrived at Gansenji. For the next two years or so, the temple served as the prestigious head temple of the sect. In the Edo period, in 1610, Shogun Tokugawa Ieyasu endowed Gansenji with the title to a territory stretching 800 m north to south and 550 m east to west, made independent from the surrounding Kishiwada domain. From this time to the Meiji period, the head of the Bokuhan family of each generation served as both the chief priest of Gansenji and as a feudal lord. The temple's territory reverted to government control in the Meiji period, but part of the town that developed there under the temple's rule still remains today, conveying the old atmosphere of the past. This area is now known as Kaizuka Jinaicho, a community of families that have lived there for generations.

In addition to the Main Hall, there are numerous important cultural properties on the premises of Gansenji Temple, including its front gate, drum tower, and belfry. They are arranged in a manner typical of a medium-sized temple under the True Pure Land sect.

Fig. 2 Gansenji Temple Main Hall (exterior)

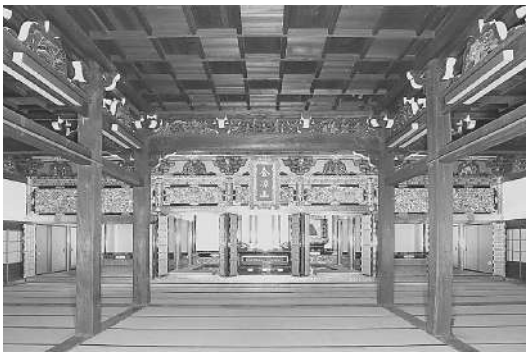


Fig. 3 Gansenji Temple Main Hall (interior)

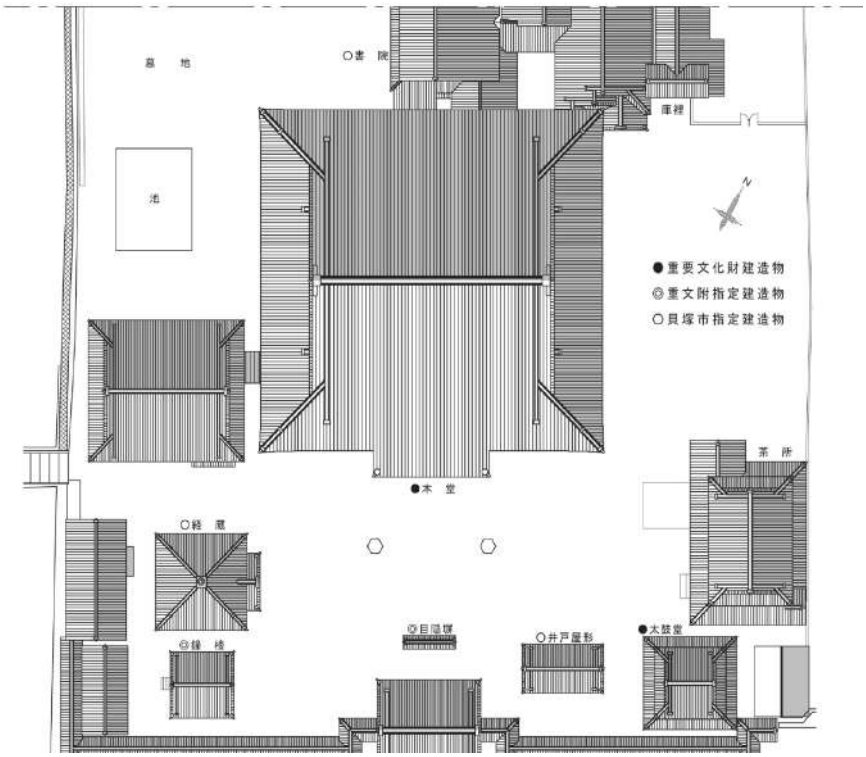
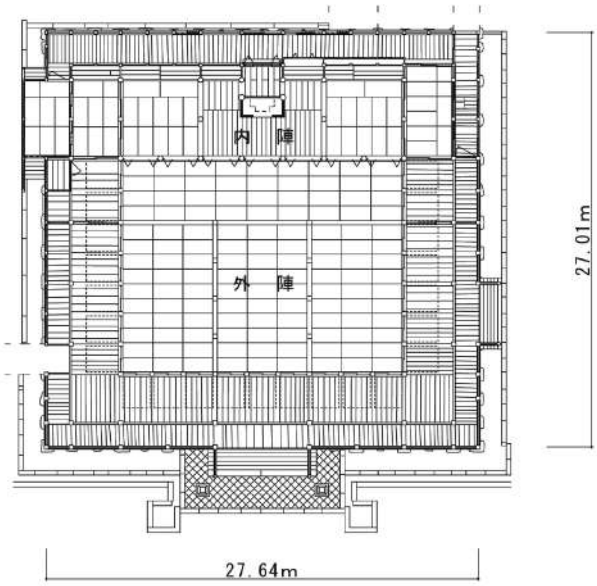


Fig. 4 Gansenji Temple: Layout

Characteristics of the Main Hall

The present Main Hall of Gansenji Temple was built in 1663. Its frontal width is 27.6 m and the side width is 27.0 m. The maximum building height, from the ground to the roof ridge, is 15.8 m. It has a single-story hip-and-gable roof structure. The roof is tiled alternately with flat concave and rounded convex tiles. The interior of the Main Hall is largely composed of *naijin* or the chancel, the space for the Buddha, and *gejin* or the nave, the space for worshippers. The nave is surrounded by a veranda on three sides.



The chancel is brilliantly decorated with lacquer, colorful paints, and gold foil in stark contrast with the austere nave where bare wood predominates. The chancel is an artistic representation of the notion of the Pure Land, the Buddhist equivalent of paradise. In terms of size, the nave is more spacious and has a higher ceiling. This clearly indicates the evolution of the main hall of a Buddhist temple, which was originally the space for placing an image of Buddha, but gradually its function as a gathering place for the congregation also became important. This evolution is also reflected in the architectural design: the floor plan was drawn up with the size of one *tatami* mat as a basic unit, as is generally done for traditional Japanese private residences.

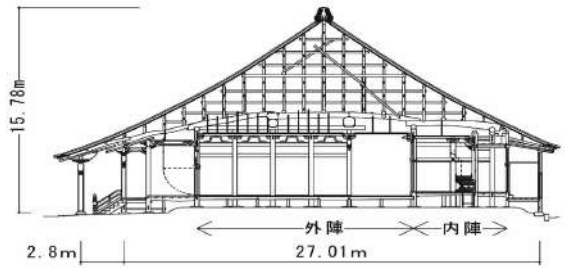
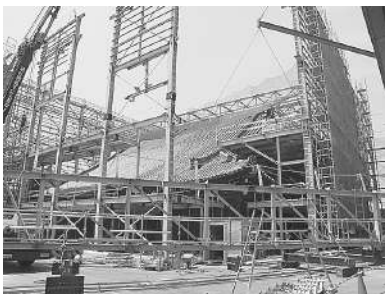
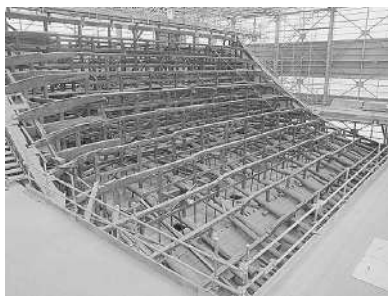


Fig. 6 Cross section of Main Hall (side view)

Restoration of the Main Hall

From 2004 to 2011, the Main Hall, the front gate, the belfry, and the outer walls of Gansenji Temple underwent restoration. The Main Hall had already undergone various partial repairs and renovations since its construction some 350 years ago, but no fundamental restoration. For this reason, considerable deterioration was found in various sections: pivotal distortion, drooping eaves, and decayed wood due to leaks in the roof, as well as the erosion of the floor base by termites and rusting of the exterior metal elements due to exposure to ocean winds.





Because of the state of damage, it was decided to restore the Main Hall by semi-disassembly: in other words, everything except the main frame (pillars and beams) would be removed for reinstallation or replacement. Since this would be a large project and take a long time, a temporary protective roof to cover the whole building had to be constructed before the restoration work could begin. After that, the roof and other sections of the Main Hall were disassembled in the reverse order of construction. During this process, the materials, dimensions, construction methods, and other particulars of the dismantled sections were carefully studied and recorded to determine the specifications of replacements.

Fig. 7 Restoration work flow

Replacements were manufactured and installed by artisans who have mastered the time-honored expertise of traditional Japanese architecture, using the same materials, dimensions, and construction methods as the original ones. These skills have been passed down from ancient times, and most architectural monuments in Japan have been restored in this manner.

4. New technologies

a. Seismic reinforcement

In Japan, the Great Hanshin-Awaji Earthquake in 1995 emphasized the critical importance of safety for buildings. In the disaster, large numbers of architectural monuments were damaged and some of them completely collapsed. Following this experience, various organizations have been testing architectural buildings to evaluate their seismic resistance, and have been restoring

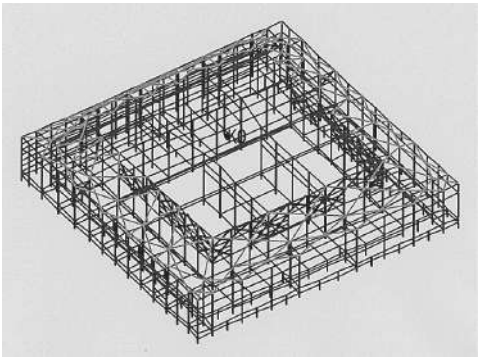


Fig. 8 Analysis model

those judged to be insufficiently earthquake-resistant.

When the Gansenji Temple was restored, its seismic resistance was also assessed at the same time. A 3-D model of the temple's framework and its response to earthquakes was created on a computer, and earthquakes of likely magnitudes were simulated. The results showed that the temple could collapse in a major earthquake, so we decided to perform seismic reinforcement as well.

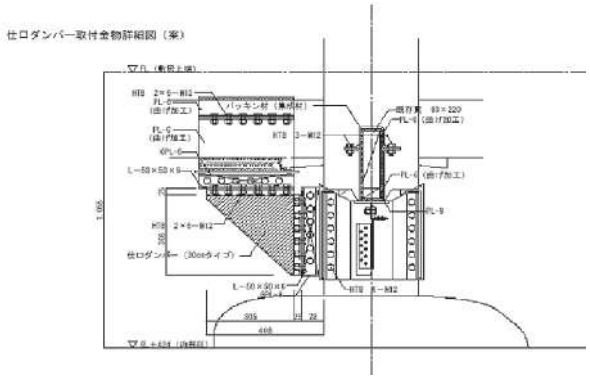


Fig. 9 Details of a damper

There are various ways of reinforcing a building's seismic resistance, including adding building rigidity, regulating responses to an earthquake, and isolating the building from seismic motion. Each method has both advantages and disadvantages. For example, to increase wall rigidity, it is necessary to close openings, but for the Gansenji Main Hall project, the original form of the interior would be lost. On the other hand, regulation and isolation methods are usually large-scale and costly.

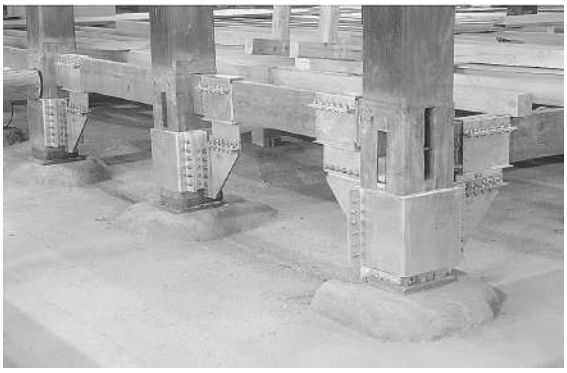


Fig. 10 Beam-column joint dampers

As an alternative, we considered a small seismic control device recently developed for wood structures. This device, made of two metal plates sandwiching highly viscous resin, is installed where building elements meet at right angles, such as columns and beams, to absorb the energy of deformation. When the building sways, the two plates slide, while the resin suppresses this movement, absorbing the energy of deformation and transforming it into thermal energy. This device is called a beam-column joint damper.

Following a series of studies, we chose a method combining rigidity reinforcement and seismic regulation. To reinforce building rigidity, the existing walls were strengthened instead of creating new wall surfaces, at sections under the roof that are invisible from within the Main Hall. In sections where this method was insufficient, beam-column joint dampers were installed below the floor. As a result, the predicted sway of the building was reduced within prescribed permissible limits.

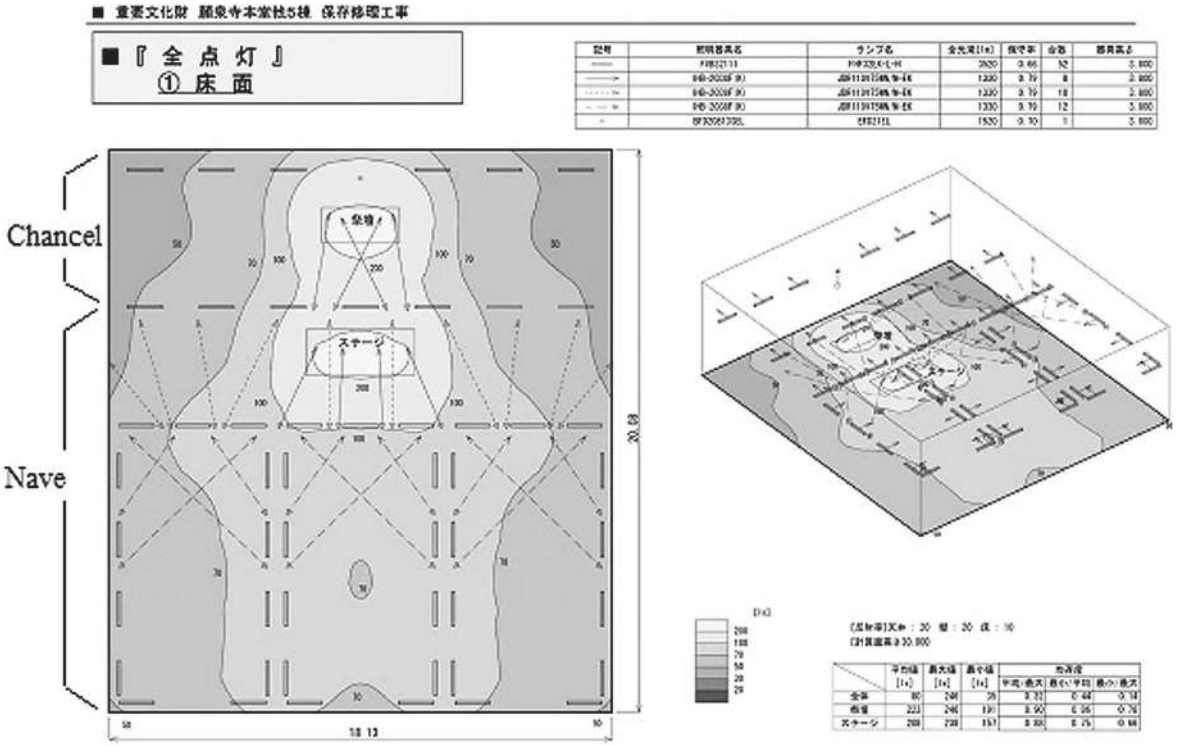
b. Technology for more active use (illumination)

While some architectural monuments have lost ties with local residents in recent years, Gansenji Temple has been serving for over 20 years as a center of local community activities through which residents rediscover the history and cultural attractions of Kaizuka Jinaicho and publicize them widely outside the community. As a part of these activities, an event called "Gansenji Theater" is held at the temple, featuring traditional Japanese performing arts such as

Fig. 11 Noh performance in the nave

noh, *kyogen*, and *rakugo* (comic story-telling) and concerts.

In the restoration project, the use of the nave, originally a place of prayer, as a theater was taken into consideration, and lighting equipment for effective illumination was installed. The placement and other details of the lighting equipment were also carefully determined to harmonize them with the traditional interior design.



c. Technology for preserving colors lost during restoration

During the restoration of the Main Hall, at the same time as disassembling the building elements, the traces of past renovations were examined, and the changes that the building had undergone since its establishment were unveiled. Based on these results, and in consultation with representatives of the Gansenji Temple and the Agency for Cultural Affairs, we decided to restore the Main Hall not to its original state but to its state in the Horeki era (1750s), when the Main Hall was at its most majestic. The colors of the Horeki era remained below the present top layer, and by carefully examining those colors, Horeki-era designs and color schemes were successfully restored.

Fig. 13 Examining colors

In this process, a special measure was taken. The presently visible color schemes, patterns, and paints, different from those of the Horeki era to be restored, were considered worth preserving for future generations. In such cases in the past, they would be recorded by photography or drawings, and actual surfaces would be scraped off and lost for good. In the Gansenji

Fig. 14 Peeling, step 1

Temple project, the presently visible colored layer was in good condition, and the coloring technique used on the layer was considered to be sufficiently important to be worth preserving as-is for future generations. Accordingly, we used a recently developed method consisting of peeling in order to preserve such material.

Fig. 15 Peeling, step 2

This simple method involves applying gauze to a colored surface, painting *nikawa*, or traditional Japanese glue, over it, drying it until the glue obtains sufficient viscosity, and then gently peeling off the gauze, paying attention to the way the glue is attached to the surface. In this way, only the top layer was peeled off, revealing the Horeki-era layer.

The restoration of Gansen-ji Temple was the first time to apply this method to an Important Cultural Property.

The advantages of this method include that peeled-off layers can be reattached to new mounts of *washi* (traditional Japanese paper) for preservation and comparison with the restored layers, providing future generations with useful information on the history of the building's renovations. Traditional glue was used to protect the paints, so the materials could be kept intact and historical information transmitted to future generations without modification, which we believe is particularly important.

5. Summary

I have explained about the restoration of Gansenji Temple Main Hall, for which traditional expertise as well as new technologies were employed. In applying any new technologies such as these, it is essential to accurately determine the value of the particular monument and take great care not to compromise it. I believe that restorers need to understand the respective values of individual buildings and develop or apply new technologies accordingly.

IV. Conclusions

Conclusions of International Conference 2013

"Revisiting the Philosophy of Preserving Wooden Structures: Restoration Method for Wooden Structures and Its Philosophy"

Preface

The International Conference on "Revisiting the Philosophy of Preserving Wooden Structures: Restoration Method for Wooden Structures and Its Philosophy" was co-organised by the Cultural Heritage Protection Cooperation Office, Asia-Pacific Cultural Centre for UNESCO (ACCU Nara) and World Heritage Institute of Training and Research for the Asia and the Pacific Region under the auspices of UNESCO (WHITRAP Shanghai). The scope of the conference was to look into the developments in conservation policies particularly concerning wooden heritage structures over the two decades since the Nara Conference on Authenticity in 1994. It was the first of three conferences that are to be organized over a three year period, and it took place in Nara from 17 to 19 December 2013.

Eighteen invited experts, and several observers, attended the conference representing WHITRAP, ACCU, and ICCROM, as well as governmental and research institutions from Bhutan, China, Indonesia, India, Japan, Nepal, Sri Lanka, and Vietnam. On 17 December, guided visits were organized to examine conservation work in Shonen-ji Temple (Imai cho), and in Hōryū-ji Temple. During subsequent two days (18 and 19 December), a special lecture on conservation philosophy, two Keynote Speeches, and seven Case Study Reports were presented.

The participants appreciated the hospitality, sponsorship, and excellent organization by ACCU and WHITRAP. They commended this collaborative initiative aimed at addressing conservation philosophy and methodologies in the light of contemporary challenges and discourses, and adopted the following recommendations.

Conclusions and Recommendations

Regarding the issue of authenticity, it was recognized that, together with the concept of cultural landscape, the 1994 Nara Conference on Authenticity marked a significant paradigm shift in conservation policies. The pre-Nara emphasis on material authenticity in heritage evaluation has now broadened to include intangible aspects of heritage, and recognition of diversity. These concepts have been further elaborated and specified in UNESCO´s international doctrine, including the 2003 convention on intangible heritage, the 2005 convention on heritage diversity, and the 2011 recommendation concerning the Historic Urban Landscape, showing an increasing broadening from exceptional to common heritage.

While recognizing the continuously evolving heritage policies, the participants sustained that the 1994 Nara Document on Authenticity be maintained as a historic reference, similar to the 1964 Venice Charter. The emerging needs for relevant policies should be interpreted in new documents and with reference to the 1994 Document.

Regarding operational interpretation of authenticity in conservation practice, the participants observed that the pre-Nara emphasis on material authenticity and minimum intervention continues to prevail in public policies on conservation of State protected built heritage. However, in the broader

context of cultural landscape and urban conservation, such policies are not strictly attained to and may actually need reconsideration. A gap is recognized between the on-going international debate on heritage policies, and the national and local interpretation of authenticity. Challenges are encountered in local interpretation due to inconsistent use of specific technical terms in different languages. A more holistic view that takes into consideration local context and sources of information is desirable for defining the significance of the property.

The concepts and principles of the 1994 Nara Document should be elaborated as practical guidelines for undertaking conservation interventions, illustrated with select case studies. The guidelines could start as an informal document, but once consolidated could be proposed for adoption and publication by relevant institutions. The guidelines should be made multi-lingual with a recommended glossary of terms.

There appears to be some confusion regarding the relationship between Integrity and Authenticity. According to the WH Operational Guidelines, integrity refers to the process of identification of all the elements that together define the significance of the property. Authenticity instead refers to the qualification of such elements in terms of their truthfulness and credibility. It can be observed that, in certain cases, part of the material authenticity of a property may be lost due to repairs or partial reconstruction, while the architectural integrity gets re-established at the same time. In other cases, the formal integrity may have been lost in ruined structures, while material authenticity of the remaining fragments still exists.

The illustrated guidelines proposed above should discuss the different aspects of authenticity, e.g. in relation to creative cultural expressions, historical material, and the social-cultural context of the decision-making processes. Furthermore, discussion should extend to the conditions of integrity, e.g. the identification and the cultural, functional, or symbolic relationship of elements that contribute to the significance of a place in its context, and its state of conservation.

Further, the participants observed certain differences in current relationship between on-going practices and traditional continuity. While there do exist genuine traditions inculcated over generations, modern practices in conservation may easily cause changes if not properly controlled when excessive resources are made available, e.g. from international tourism and/or globalized trade. These practices may augment vulnerability of heritage due to increased pressure and lead to interventions such as the 19th-century idea of ´period restoration´ that unfortunately continues to be an option for tourism promotion.

Research institutions are therefore encouraged to undertake research projects on the history, the recognition and treatment of human creative expressions in their context. Such research should also take note of the evolution of the international doctrinal frameworks for conservation.

Regarding hierarchy of priorities, there is urgent need to clarify the significance of heritage resources and how this relates to judgements on values. While authenticity is basically related to the significance of the property, value judgements, instead, are the result of learning processes. ***These concerns should be integrated into relevant capacity building programmes.***

V. Appendix

1. General Information of the Conference

International Conference 2013
"Revisiting the Philosophy of Preserving Wooden Structures:
Restoration Method for Wooden Structures and Its Philosophy"
(17 – 19 December, Nara, Japan)

1. Organisers

This conference is jointly organised by the Agency for Cultural Affairs, Japan (*Bunkacho*); the Asia-Pacific Cultural Centre for UNESCO; National Institutes for Cultural Heritage, National Research Institute for Cultural Properties, Nara and Tokyo; and WHITRAP Shanghai under auspices of the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), the JAPAN ICOMOS National Committee, the Japanese Association for Conservation of Architectural Monuments (JACAM), Nara Prefectural Government and Nara Municipal Government.

2. Background and Objective

In the Asia-Pacific region, there are many wooden structures rooted in the history and culture of each local area still remaining today. This is due to the efforts made in implementing appropriate repair, restoration, and maintenance suited to the times. In order to sustain this maintenance into the future, the understanding and participation of local communities are essential, as well as the procurement of materials and the transmission of traditional skills.

When it comes to wooden structures, the "Nara Document," which was formulated in Nara in 1994, has been playing a key role. However, it does not necessarily mean that this conservation philosophy has subsequently led to social transformation.

ACCU Nara has hosted international conferences with multi-year themes such as "Risk Management" (2006-2008) and "Human Resources Development for the Transmission of Traditional Skills" (2010-2012). For multiple years from 2013, we are scheduled to organise a series of international conferences with the new theme of "Revisiting the Philosophy of Preserving Wooden Structures."

The aim of the 2013 conference is to develop understanding on the relationship between social transformation and conservation of cultural heritage after the Nara Document, especially focusing on how to view the conservation of timber structures.

3. Dates and Venues

Dates: 17 to 19 December 2013
Venues: Nara Prefectural New Public Hall (101 Kasugano-cho, Nara City), etc.

4. Schedule

Day 1 Tuesday, 17 December
08:45-17:00 Participants visit to the restoration sites at Shonen-ji Temple and Horyu-ji Temple in Nara

Day 2 Wednesday, 18 December
09:15 - Opening Session

10:00 - Special Speech
11:00 - Keynote Speech I - II
14:10 - Case Study Report I – III

Day 3 Thursday, 19 December
09:30 - Case Study Report IV-VIII
13:20 - Summary of the Conference
13:20 - General Discussion
15:20 - Closing Session

5. Working Language

The working language of the conference is English. Simultaneous interpretation between English and Japanese is provided when necessary.

6. Financial Arrangements

Organisers provide each of the participants with:

1) Travel Expenses: A round trip air ticket (economy class) between the international airport nearest the participant's residence and Osaka (Kansai) International Airport.
2) Daily Subsistence Allowance (DSA): A fixed DSA from 16 to 20 December to cover the participant's meals, as well as hotel accommodation (including breakfast), which is arranged by the organisers.

7. Correspondence

All enquiries and correspondence concerning the Conference should be addressed to:

❖ **ACCU Nara**
Cultural Heritage Protection Cooperation Office,
Asia-Pacific Cultural Centre for UNESCO (ACCU)
Nara Prefectural General Office 1F
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❖ **WHITRAP Shanghai**
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the Pacific Region under the Auspices of UNESCO (Shanghai)
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2. Schedule of the Conference

Day 1 (Tuesday, 17 December)

Excursion: Participants visited Shonen-ji Temple and had an on-site lecture of the restoration site in the temple by Mr KANEKO Takayuki, a head of Shonen-ji Temple Branch Office, Cultural Assets Preservation Division, Nara Prefectural Board of Education. They also walked around Imai Town, where the vernacular houses and cultural landscape have been preserved. In the afternoon, they visited the restoration site at Horyu-ji Temple under the guidance of Mr MIKITA Hideo, Head of Horyu-ji Temple Branch Office, Cultural Assets Preservation Division, Nara Prefectural Board of Education.

Day 2 (Wednesday, 18 December)

09:15 – 10:00 Opening Session

Welcome addresses by organisers and guests: Mr YAMATO Satoshi, *Councillor* for Cultural Properties, Agency for Cultural Affairs, Japan; Dr ISHIZAKI Takeshi, *Vice Director* National Research Institute of Cultural Properties, Tokyo; Mr SUGIYAMA Hiroshi, *Director* of Department of Planning and Coordination, National Research Institute of Cultural Properties, Nara; Dr Ron Van Oers on behalf of Prof. ZHOU Jian, *Director*, WHITR-AP Shanghai, World Heritage Institute of Training and Research-Asia and Pacific (Shanghai); and Mr NOMURA Masaki, Director, Regional Development Department, Nara Prefectural Government.

10:00-10:45 Special Speech: Dr Jukka Jokilehto (ICCROM)
"Conservation Philosophy Applied to Wooden Structures"

11:00-11:45 Keynote Speech I: Mr YAMATO Satoshi (Japan)
"The Nara Document and the Conservation of Wooden Structures in Japan"

11:45-12:30 Keynote Speech II: Dr Zhu Guang Ya (China)
"Protecting Authenticity and Value in Restoring both Interior and Exterior of Traditional Wooden Structure of East Asia"

14:10-14:45 Case Study Report I: Mr Hou Weidong (China)
"Disputes and Debates: Approaches to the Protection of the Wooden Pagoda of Yingxian County"

14:45-15:20 Case Study Report II: Mr Kai Weise (Nepal)
"Conservation of Wooden Elements in the Architectural Heritage of Nepal"

15:40-16:15 Case Study Report III: Mr Priyantha Basnayake (Sri Lanka)
"Restoration of Tampita Vihara (Temple on Pillars) at Dambadeniya"

18:30-20:00 Reception

Day 3 (Thursday, 19 December)

09:30-10:05 Case Study Report IV: Ms Vu Thi Ha Ngan on behalf of Mr Tran Dinh Thanh (Viet Nam)
"Principles and Techniques in Conserving and Restoring Wooden Architectural Heritage Sites in Viet Nam"

10:05-10:40 Case Study Report V (read by ACCU Nara staff): Ms Mida Andriana, S. Si, MA (Indonesia)
"Conservation of Traditional Wooden House (Joglo) at Kotagede, Yogyakarta, Indonesia"

11:00-11:35 Case Study Report VI: Mr Yeshi Samdrup (Bhutan)
"The Practice of Wooden Conservation in Bhutan"

11:35-12:00 Case Study Report VII: Mr FUJIKURA Ken-ichi (Japan)
"The Trends in Restoration of Cultural Properties in Japan −Case Study of Conservation and Restoration Project of Main Hall at Gansen-ji Temple−"

13:20-16:30 General Discussion: All participants
"Revisiting the Philosophy of Preserving Wooden Structures"

16:30- Closing Session

3. List of Participants

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