‘Archaeologizing’ Heritage?

Transcultural Entanglements between Local Social Practices and Global Virtual Realities

Michael Falser · Monica Juneja *Editors*

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Editors

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Transcultural Entanglements between Local Social Practices and Global Virtual Realities

Proceedings of the 1st International Workshop
on Cultural Heritage and the Temples of Angkor
(Chair of Global Art History, Heidelberg University,
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Cover illustration: The cover illustration "Ruines Khmères du Cambodge" is a water colour by the French architect Lucien Fournereau (1846–1906) who participated in an 1888 French mission to the Siamese site of Angkor to take plaster casts from the temples for Louis Delaporte's *Musée Indochinois* in the Parisian Trocadero Palace. He returned with 520 casts and a large set of drawings ranging from exact sections, elevations, and floor plans of various temples to detailed studies of their decoration and, finally (as depicted in the detail here), a visionary, picturesque, and 'archaeologizing' collage: it combined various Angkorian temple sites and their architectural elements and reduced the temple's stakeholders (the monks) to passive staffage figures. Fournereau's drawings were exhibited during the 1889 *Exposition Universelle* in Paris and are housed in the archive of the *École nationale supérieure des beaux-arts* in Paris. Special thanks to Monique Antilogus and Emmanuel Schwartz from ENSBA for their valuable help. (©École nationale supérieure des beaux-arts, Paris; Photo: Jean-Michel Lapelerie).

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Preface

This volume is the product of the project 'Heritage as a transcultural concept' coordinated by Monica Juneja and Michael Falser. It is informed by the perspective of a transcultural history of art which responds to the challenge posed by global connectivity to existing disciplines. The Heidelberg Chair of Global Art History, instituted within the Cluster of Excellence 'Asia and Europe in a Global Context,' works to effect a deconstruction of disciplinary models within art history which have marginalized experiences and practices of entanglement. By focusing on the long-established disciplines of archaeology, architectural conservation, and preservation, as well as on 'new' specialisations such as scientific computing, this book contributes to the chair's major interest in investigating the formation of key concepts, such as heritage, in art history.

The project 'Heritage as a transcultural concept' charts the colonial, postcolonial/nationalist, and global trajectories of the notion of cultural heritage. An important case study that it researches is the twelfth century Cambodian temple Angkor Wat—the subject of a forthcoming monograph by Michael Falser—and the different phases of its history that unfolded within the transcultural interstices of European and Asian projects and conceptual definitions: from its 'discovery in the jungle' by French colonial archaeology in the nineteenth century to its canonisation as a symbol of national identity during the struggle for decolonisation and under the postcolonial Khmer Rouge regime, and finally as a global icon of contemporary heritage schemes. Studies of material traces and architectural forms as well as literary and visual representations of the structure are undertaken with a view to analysing processes of transfer and translation, as well as the recent proliferation of hybrid art forms in the wake of the monument becoming a media icon.

The investigation of heritage from a transcultural perspective questions diffusionist master narratives that constituted their units of analysis in terms of a metropolitan *Leitkultur* and a recipient culture on the periphery; instead it investigates both entanglements and inner pluralities in each of the units. It draws attention to the ways in which local agencies engage with 'universalising' concepts and debates on their own terms. Such processes are seen to create a 'third space' in

which a particular monument comes to be refracted through the prism of new visualities, which are also central to the essays in this book.

It is the pleasant duty of the editors to thank all those who contributed to the making of this book—above all the authors and participants of the workshop of the same title held in May 2010 where several of the papers included here were initially read and discussed. In addition, sincere thanks are due to Andrea Hacker of the editorial office for her friendly and efficient management of the project from the start; to Angela Roberts for careful and competent copyediting, to Petronela Soltesz, Jennifer Pochodazalla, and Brigitte Berger-Göken for technical assistance. Finally, we are grateful to the two anonymous reviewers of the manuscript as well as to the series editors for their constructive suggestions.

Heidelberg, Germany — Michael Falser
March 2013 — Monica Juneja

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‘Archaeologizing’ Heritage and Transcultural Entanglements: An Introduction

Michael Falser and Monica Juneja

Theoretical Preliminaries

The appropriation of the past by actors in the present is subject to multiple dynamics. These span a field of forces composed of nation states, transnational organisations, and local communities, each concerned with preserving the remains of the past in order to emblematize identities, to protect and project a nation’s patrimony, or alternatively to construct a notion of world heritage. There are many facets to the study of heritage in modern societies; the concept is part of a transcultural order that has emerged in the last two centuries. A child of the European Enlightenment, it circulated under the aegis of colonialism across the globe where it was harnessed to the civilizing programme of the colonial state and at the same time appropriated by the agenda of nation building to wrest locality from the global constellation of empire. In the contemporary world, heritage has become increasingly enmeshed with modern media, tourism, and the spectacle, which in turn has led to the creation of a veritable ‘heritage industry.’ Today’s global heritage industry does not flatten cultural difference; rather, it exploits the particularity of the local and re-packages the exotic as a commodity for the world bazaar in ways that are reminiscent of the Orientalist fabrications in the world exhibitions of the nineteenth century. Yet the globalization of ethnicity ought not to detract from the observation that the varied national and local articulations of identity and its tangible anchors make heritage a contested issue and often a site of tension and violent conflict (Gamboni 2001; Flood 2002; Juneja 2009; Falser 2011a).

All of these dimensions have challenged scholarship to search for explanatory models that are able to grapple with the questions they raise. The thrust of most critiques of Eurocentric notions of heritage and conservation that have informed

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recent scholarship is that these notions, premised as they are on specifically Western ideas of aesthetic and historical value, can no longer claim universality. Therefore, conservation must incorporate the cultural values and beliefs of the communities whose heritage is being preserved from the outset. While the issue of epistemological violence cannot be dismissed, we need to be cautious about polar oppositions; such frameworks are premised upon binaries that do not address issues of transcultural circulation or the mobility of concepts and the processes of their reconfiguration in new settings. A key question raised by a transcultural study of heritage is whether or not the rhetoric of a community's identity or a nation's patrimony replicates the mythical notion of a culture as single, unique, and bounded, understandable purely from within. What were the trajectories of the concept of heritage as it was transformed into a civilizing instrument both at home and exported to the colonies? How does this notion grow through appropriations and reconfigurations in the course of different historical moments? Scholarship is called upon to address histories of conflict and entanglement and to examine the extent to which multiple narratives and experiences, constituted via transcultural processes, become flattened and sanitized through the concept of built structures as consensual sites of memory, in the canonical sense of the term coined by Pierre Nora (Juneja 2009).

A further challenge to the study of heritage has been posed by the emergence of modern digital media. On the one hand, these have proved to be useful working tools in the practice of conservation; on the other, the new 'aura' with which this global virtual 'reality' endows its objects calls for reflection. Globalization and the digital media have created an electronic cultural space marked by a placeless geography of image and simulation. In this world, space and time horizons are compressed and collapsed through the illusion of entirely fluid boundaries. One effect of virtual geographies has been to provoke a resurgence of locality and regions seeking to be recovered from absorption into a universal virtual realm. And yet there is a need to be careful of idealizing the local as a homogenous and purely redemptive space, instead of coming to grips with its fractures and viewing it in relation to the region, nation, and the world.

These and other related scholarly questions and challenges provided the stimulus for the international and interdisciplinary workshop whose proceedings are published in this volume. The aim of this enterprise was to initiate a discussion on the historical formation of the notion of 'archaeological heritage' and the contemporary challenges it faces as it negotiates the space between local social practices and virtual global realities. The workshop took place at the Karl Jaspers Centre for Advanced Transcultural Studies over two days in May 2010 and was organized by the Chair of Global Art History in collaboration with the Institute of Scientific Computing, Heidelberg Graduate School of Mathematical and Computational Methods for the Sciences. The contributions included a selection of case studies from Myanmar, India, Nepal, and Afghanistan, together with a substantial focus on the Angkor Archaeological Park in Cambodia, a UNESCO World Heritage Site. Two different approaches to 'archaeological heritage'—from the perspective of both the Humanities and Computer Sciences—were defined as a starting point for the workshop.

From the perspective of intellectual and architectural history, the concept of 'archaeological heritage' sites in Asia can be traced to the nineteenth century when European powers like Great Britain or France transferred their notion of 'dead archaeological ruins' onto Asian sites in their colonies or protectorates (for South Asia see Juneja 2001; Guha-Thakurta 2004, for Southeast Asia see Edwards 2007). However, heritage is not always a part of a bygone era, more often it is a living component of communities and comprises local, social, and ritual usages that prevail on sites, both religious and secular. These were subject to colonial interventions that were frequently informed by a romantic notion underscoring the necessity of conserving overgrown, deserted, and forgotten sites. Interventionist measures aimed at a total reconstitution of these sites. These initially took the shape of drawings or models (Falser 2011b) that were followed by a physical reconstruction on-site using modern technology. The extent to which the contemporary trend (advocated by an international scientific community) towards simulation techniques on existing and presumably reconstructed archaeological heritage sites in Asia can be interpreted as a new incarnation of colonial practice in a globalized forum is still an open question.

Until about a decade and a half ago the modern disciplines of archaeology, historic preservation, and conservation sciences were complicit with the present-day globalized perception of dead archaeological ruins—very often with disastrous results for local practices and the expectations surrounding these sites. More recently, the global heritage preservation community, having assumed the role of preserver and careful manager of 'living heritage sites,' has discussed a pragmatic change in this attitude (Smith 2004).

From another, more optimistic point of view, we can no longer overlook the fact that the application of mathematical and computational modelling to simulate and optimize temporal and spatial processes has become a standard research tool in the natural sciences. With the availability of cheap and powerful desktop computers and the development of databases and digitized texts, scientific computing experts are set to bring these methods to the humanities and social sciences as well. Archaeology constitutes a major new field where the application and the possibilities of computer modelling are being explored. Vast geometric models of temples and monuments along with detailed scans of archaeological findings and simulations of timeline events establish a virtual representation of 'once-upon-a-time' and 'might-have-been' sites. Yet these techniques call for prudent and selective use. Differences in the reception of technical methods across Asia and Europe, especially when related to cultural heritage sites, critically influence what might at first sight appear to be a straightforward approach. Selected case studies ought to present us with a picture of the recent paradigmatic change in the computing discipline itself. This has shifted from being a mere simulation of supposedly dead archaeological building material to showing an increased appreciation and scientific incorporation of the knowledge of local stakeholders and their ritual and social practices on living sites, as well as of the social behaviour of an increasing globalized cultural tourism industry.

An Introduction to the Contributions in this Volume

Most of the original papers presented at the workshop are now part of these proceedings, and a few other authors were invited to join and enlarge the thematic focus of our discussion. The contributions to this book, which might strike the reader as being heterogeneous in style, approach, and message, include essays written by historians, art or architectural historians, art curators, geodesists, experts in scientific computing, architects and archaeologists, stone conservators, and social anthropologists. The articles range from conceptual papers with a more academic tenor from a humanities perspective, while others present concrete research projects in a short and dense form; a number have been authored by practising architects and conservators and reflect long experience in the field. In view of the circumstance that the study of heritage forms a field where an unusual range of disciplines intersect—archaeology, conservation, art history, architecture, anthropology, and urban studies on the one hand and, increasingly in recent times, computer sciences and engineering on the other—what at first glance appears as an impossibly disparate disciplinary constellation within the covers of a single book could turn out to be a source of new insights for the field. It is only by bringing these together in a form of methodological confrontation that we can begin to come to grips with many of the tangled questions that beset the field of heritage both at the theoretical and the practical level. These questions have been highlighted in the following part of this 'Introduction' (which accounts for the relatively detailed discussion of individual contributions) where we, the editors, have consciously inserted cross-references to articles in the volume that speak to each other across disciplinary divides. Similarly, references have been built into individual articles signalling connections and thematic links with others in the book so as to make shared, intersecting, or disjunctive patterns of argumentation more visible to the reader. The dialogue—often beset with tensions—between perspectives from the humanities, the social sciences, and the natural sciences translates into a host of measures that are enacted in the field of heritage—for instance when it comes to the restoration of sites, the formulation of tourism policies, the resettlement of localities, the reconstruction of dilapidated (or destroyed) structures, and the often contentious politics of memory. In a sense this volume can be viewed as a discursive site to replay those negotiations and to acquire insights into issues that otherwise get muffled by a framework that seeks cohesiveness through disciplinary unity.

The six parts of the book are organized around and framed by four processes, concepts, or methods that inform the notion of cultural heritage:

- Archaeologizing

The four contributions in the first two parts will discuss European 'strategies' in the nineteenth and early twentieth centuries, which sought to transform local architecture on colonial territories (here the focus is on India and Cambodia) into the colony's heritage/*patrimoine*. This formed an aesthetic approach to built cultural heritage that transformed existing remains into a pictorial and pleasing object in

accordance with prevalent cultural conceptions like the picturesque. 'Archaeologizing strategies' include the establishment of conservation manuals, the introduction of picturesque photography, the translation of local architecture into plaster casts for European museum displays, and the drafting of a visitor's *parcours* in 'archaeological' parks for the growing tourist industry in Asia.

- Virtualizing

The four contributions in this part shift the focus to postcolonial states from the second half of the twentieth century to the present day; they discuss computer technologies that bring the 'archaeologizing' dimensions of the earlier part onto a different register. Existing built cultural heritage is transformed through the agency of a global community of experts into virtual and globally accessible 2D-façade simulations and 3D-models. The potential and the limits of these new 'virtualizing strategies' are discussed and cover options ranging from surface-based imaginary worlds of cultural heritage icons to computer models for applied research on site.

- Restoration and Interpretation

This section introduces three on-site case studies that illustrate the emerging paradigm shift in applied conservation sciences and can be summed up as a 'living heritage' approach. It tries to merge modern high-tech preservation methods and the interpretative computer modelling of built cultural heritage (the focus is on the Angkorian temples and covers not only the temples themselves but also the larger environmental aspects of 'sites') with a respectful incorporation of the interests of local stakeholder communities in their daily social practice.

- Commemorating/Memorializing

The last part of this book comprises three contributions on the different strategies through which political regimes, as well as local religious groups, conceptualize and memorialize 'archaeological heritage' for and within their belief systems. It discusses how local stakeholders react to and live within 'archaeological heritage' and may adopt counter-strategies for their daily living, cultural identity, and collective memory. Within these case studies it will become clear that both modern conservation and computer sciences reach their limits when analysing, interpreting, depicting, and manipulating socio-cultural complexes that were once conceptualized/invented as built 'cultural heritage' or *patrimoine culturel*.

The opening part *Archaeologizing Heritage I: India between the Manual and the Picturesque* features two studies by **Indra Sengupta** and **Katharina Weiler**, which discuss the constitutive role of the European aesthetic (i.e. visual, artistic, philosophical) in colonial India accompanied by institutionalized definitions of built heritage and technical standards for its documentation, mapping, classification, and selective conservation and restoration.

Indra Sengupta takes a close look at John Marshall's *Conservation Manual*, which served as a "prescriptive colonial text of authority." She analyses this work as part of a braided history involving the conservationist movement in Great Britain

on the one hand, and the specific cultural-cum-political and regional initiatives in British India on the other. The Ancient Monument Preservation Act of 1904, a product of Lord Curzon's engagement for India's built heritage during his tenure as Viceroy (1899–1905), meant that the 'making of' and conservation of (picturesque) ruins served first, as a metaphor for India's cultural decline and the irretrievable 'pastness' of its history; and second, to justify the British mission to civilize Indian's past by way of an institutionalized programme of archaeological research and custodianship. Sengupta links this colonial trend back to the metropolitan 'anti-scrape' theories of Victorian England that were advocated by John Ruskin, William Morris's Arts and Crafts movement, the Society of Antiquaries and, finally, by the Society for the Protection of Ancient Buildings (SPAB), which defended the preservation of the traces of age and decay in historical buildings. However, Marshall's *Conservation Manual* for India (1923, first version 1906) reacted to a conflict that is central to the subject of this book: the inherent tension in the process of heritage-making between a global construction of supposedly dead archaeological (colonial or in other cases postcolonial) building stock, and the competing interests of local elites and communities who understood 'their' heritage not as 'dead' archaeological remains but as 'living heritage' for educational, practical, and/or religious purposes. In the context of the emerging impossibility of a centralized heritage control in India, Marshall defended (or had to defend) the restoration of pre-colonial Mogul structures like the Taj Mahal to their "original splendour" (and not the conservation of traces of decay). This was seen as important to the preservation of the monument's symbolic authority in India's present living memory as well to its living testimony of the surviving traditions of Muslim artisanship. According to Sengupta, in this context of atypical transcultural entanglement Marshall used "the specificity of the local and the regional as a counter-argument to the universalist claims of the SPAB," which was caught in the European traditions of picturesque.

Traditions of the picturesque are the subject of **Katharina Weiler**'s paper, which argues that European landscape painting, together with the aesthetics of the picturesque, pre-framed not only the approach of artists (like William Hodges or the Daniells) in the eighteenth century who made drawings and watercolour sketches of the '(re-)discovered' ancient sites on the Indian subcontinent; these visual traditions and theories also played an extremely important role in shaping the aesthetics of early nineteenth-century photographs of antique archaeological ruins. The *principles of the picturesque beauty* as described by eighteenth-century British theorists of landscape gardening like William Gilpin, instructed the domestic traveller in his search for pleasing natural scenes through the use of a so-called Claude glass or convex black mirror with a tinted surface. Such norms and practices informed the experiments of colonial photographers like Samuel Bourne (1834–1912) who, by way of the camera's ordering lens, transferred this figuration of a European gaze from an aesthetically well-structured environment onto the chaotic colonial heritage setting. The photographs, regarded as truthful and reliable documents of India's forgotten heritage, were re-converted into graphic drawings in some of the earliest architectural publications like James Fergusson's *History of*

Indian and Eastern Architecture (1876). It is significant that photography, by introducing as a scientifically exact and normatively neutral technique with which to record the status-quo of the rapidly decaying treasures of the Indian past, became one of the institutionalized methods of the Archaeological Survey of India (founded in 1862) to execute its work of documentation, and continues to influence this institution's guiding principles. Colonial photography worked in two directions: it configured pleasing tableau-like images for a growing body of travel literature and served as a basis for scientific documentation. In doing so it helped to "archaeologize" India's ancient built heritage as a static entity where living (in this case native Indian) stakeholders were reduced to diminutive and incidental figures or eliminated from the scene entirely.

In the part *Archaeologizing Heritage II*: *Creating Visual and Spatial Experiences of Angkor*, the focus shifts from colonial India and Britain to colonial Indochina and the French metropolis. **Pierre Baptiste** and **Michael Falser** discuss two modes of representing the 'archaeological heritage' of the Cambodian temples of Angkor to a European clientele: (a) the visual and formal translation of the real temples through the medium of plaster casts or their hybrid reconstitution in Parisian exhibitions before and around 1900; and (b) the spatial and temporal invention of the site through the print medium, specifically through early travel guidebooks published between 1910 and 1950. As a common feature, both strategies of appropriation detached archaeological heritage (which was considered dead) from its continuation into the present and ignored the existing social practices of local stakeholders such as village communities, monks, or pilgrims.

Pierre Baptiste's contribution can be read as a story of direct colonial contact and a hybrid re-assembling of the 'archaeological' heritage of the Far East for consumption by the European metropolis. In 1866 Napoleon III (continuing in the tradition of the Egyptian campaign of Napoleon I) ordered an exploratory mission to Indochina along the Mekong river resulting in one of the first officially organized, intellectual and aesthetic 'contacts' between the French administration and the temples of Angkor (at this time still part of Siam). The publication of this mission included Louis Delaporte's romanticized and picturesque drawings of the 'ruins lost in the jungle,' which were, interestingly enough, converted into virtual visions of idealized reconstructions (*vues reconstituées*) in his own publication some years later in 1880 (compare with Cunin's contribution). Beginning in 1873, Delaporte undertook several archaeological missions to Angkor and returned to France, along with 'acquired' or stolen original artefacts and an impressive series of physical 'contacts' (imprints) of Angkor in the form of plaster casts. Interpretable as a physical copy of the Angkorian temples' generic code, these plaster casts of almost the entire representative architectural elements on-site were finally displayed during French World and Colonial Exhibitions in/after 1878 and later in Delaporte's *Musée indochinois des antiquités Cambodgiennes*. They were exhibited in single parts and/or re-assembled to create either authentic life-size models (such as that of the west gate of Angkor Wat) or hybrid fantasy-collages using original casts (e.g. the interpretation of the Bayon temple). In some cases these reconstituted models of Angkor were more perfect in Paris than on the real

site (too perfectly straight and lacking the joints of the original stone layers). Together with the first drawings, these hybrid models can be interpreted as an anticipatory 3D-version of the temples' globally circulating virtual reality constructed by computer models more than 100 years later which produce a similar effect. In both versions, imperfections and singularities, the dynamics of patina, decay, alterations, and above all, the local social on-site value, were rarely observable. And in both cases, the public reception of the models was and still is enthusiastic. They pre-frame the visitor's expectations of the real site, whose impeccable ageless appearance can only be guaranteed through exaggerated restoration (distinct from conservation).

Pre-framing is also a central theme of **Michael Falser**'s contribution**,** which discusses the spatiotemporal formation of the Angkor Archaeological Park effected for the site by early guidebooks. With the introduction of graphic maps, walking diagrams, trails, circuits, itineraries, and *parcours* these guidebooks framed the European visitors' expectations of Angkor even before their arrival—when read either at home or during the journey of many weeks by boat from the European metropolis to the colony. Guidebooks were an effective tool deployed by the colonial authorities to regulate the tourists' selection of objects on-site as well as their physical movement, time management, and visual orientation. Forming part of a larger programme of colonial spatial politics in Indochina, these guidebooks contributed, alongside administrative measures of conservation and restoration in the "archaeological park" (officially installed as such in 1925), to the progressive diminution of the Angkorian temples' significance as a living site of local social practice. The result was a stylized heritage reserve shaped by colonial archaeology and a model of rational order. Existing villages within the park's boundaries were rarely mentioned or were occasionally reduced to a "*tableau rustique*, amusing for lovers of exotic spectacles" (Marchal 1928). They remained out of sight (and they continue to) for (inter)national visitors. Furthermore, the publication of the early guidebooks was very often initiated and financed by institutions, committees, or sponsoring societies that had a clear aesthetic, commercial, and ideological interest in the proper presentation of this newly acquired marvel of French *patrimoine*, which was considered a site that could compete in importance with the Taj Mahal in India or the temple of Borobudur in the Dutch-Indies.

Armin Gruen and **Pheakdey Nguonphan** contribute to the third part *Virtualizing Heritage I*: *The Surface and the Image*. Their papers shift the book's focus from the humanities to natural sciences and computer modelling. These two contributors develop their virtual models through surface scanning, image-based techniques, and modular surface generation, an approach that will be questioned as well as extended through methods of structural analysis and building research in Part IV.

Armin Gruen gives a useful overview of the state-of-the-art in virtual 3D modeling of archaeological heritage, which ranges from single artefacts and architectural structures to larger sites, whole cities, and landscapes. Through a combination of satellite, aerial, and terrestrial images with techniques of laser scanning, remote sensing, structured light systems, and conventional photogrammetry, this

article discusses the usefulness and limits of 3D-models as a tool for professional archaeologists, architects, and conservators. It also explores the options for educational and training purposes in real and virtual museums and in the fast-growing tourist and entertainment industry in virtual 3D-games (edutainment) and the World Wide Web. Whereas a 3D model is a computer representation of an object in 3D space, virtual simulations already act in the 4D world with information about dynamic processes such as the changes to the object over time (time as the fourth dimension) and animations with moving objects that populate the models with virtual actors ('avatars'). Gruen lists the various functions of 3D computer models: site documentation (e.g. different states of decay or destruction of fragile sites over time, like Gruen's project on the pre-Hispanic adobe architecture site at Tucume, Peru); conservation-restoration-reconstruction (e.g. testing structural interventions in virtual models); scientific analysis and visualization (like Gruen's project of a virtual re-assembling of two different parts of a statue, which in reality were placed in two different museums); site and object management; environmental monitoring; dissemination–education; and 'feeding tourist interest' where 3D models of cultural heritage are already on the way to being incorporated into worldwide digital globes like Google Earth. In his discussion of the options and limits of this technique, Gruen mentions the crucial importance of the cooperation between the producer of 3D and 4D models and the audiences/consumers (ranging from archaeologists, art historians, and cultural heritage experts to the edutainment industry). The danger lies in the expectations based on the make-believe created by virtual models that directly affect the real site, which is always more complex and rich in information and therefore intellectually and infrastructurally more difficult to access and understand. Certainly, the limits lie in the exaggerated 'beautification' of virtual models, which are in the end always more 'perfect' than the real site (see Pichard). These insights find an easy parallel in the idealistic or romanticized and exquisitely detailed drawings and photographs of the earliest explorations of Asian sites (see Weiler), the hybrid plaster cast reconstitutions of temple structures made during the late nineteenth- and early twentieth-century world exhibitions in Europe (see Baptiste), or publications created for the emerging tourist industry (see Falser). The colonization of the real site, including its local stakeholders (who are reduced to avatars?), and the pre-framing of the cultural heritage gaze seems, from this critical perspective, to continue well into the virtual world of the twenty-first century.

Pheakdey Nguonphan challenges the reader with a rather curious and original experiment using an algorithmic approach to computational architecture that combines art history, religious iconography, computer science, and applied mathematics. The analysis of the classical Angkorian building style and the differentiation of its architectural elements into six modular types that are all based on the decorative motif of the sacred lotus flower enables the author to reconstitute various temple models in the virtual space with his computational programme called "Angkor Temple Generator." Nguonphan generates a full 3D model of Angkor Wat and claims to have developed a kind of object library of Angkor's classical architectural repertoire for all temples of this style family (compare Baptiste). This

computational experiment in classifying Angkor's unique decoration system into six modules is, as the author himself admits, necessarily an (over)simplification of thousands of unique stylistic variations (compare Pichard). This approach is not only a challenge for art historians, archaeologists, and restorers on the real site, but also for the creativity of practicing architects, since this computer programme is also presented as a useful "experimental tool in developing new Khmer temple design concepts that are based on ancient Khmer construction rules."

The fourth part, *Virtualizing Heritage II*: *Computer Models for Building Research* comprises contributions by **Georgios Toubekis/Michael Jansen**, and **Olivier Cunin**. It shifts the focus from a surface-oriented approach to a structural research-oriented method that uses 3D-modelling as a tool of communication and negotiation, of different restorative interventions in a global expert and/or local stakeholder forum, or for testing hypotheses and results in building research and architectural history.

The contribution of **Toubekis/Jansen** explores the giant Buddha figures in the valley of Bamiyan, which date to the sixth century CE and were destroyed by the fundamentalist Taliban regime in 2001. Shortly after the fall of the regime in 2002, the niches and rock caves around the lost figures were stabilized, the surviving Buddha fragments safely stored, and the Bamiyan cultural landscape was nominated a UNESCO World Heritage Site. By that time, Western advanced technology and scholarship had already been imported for research and conservation of the site's existing status. But there was much more at stake: a virtual rebirth of the tragically lost cultural heritage of the Bamiyan Buddhas emerged in the form of a 3D-modelled hybrid that never existed in its present combination. This comprised a reconstruction of the pre-destruction status of the figures using old photographs and photogrammetric documentations and a laser-scanned status quo of the niches around them. Used as a tool to discuss the latest structural analysis and intended restoration measures, this 3D simulation also migrated into public life and into the real-time infotainment sector of Western exhibitions (like in Bonn/Germany 2008). In the meantime, after large parts of the local population were relocated (for supposedly security reasons) into new and highly problematic housing projects and a Bamiyan Cultural Master Plan had been established, these virtual images initiated discussions about the optional reconstruction of the lost Buddha figures between all stakeholders at the site including the global players of UNESCO and ICOMOS, academic researchers from West and East, the regional tourism-oriented government, and the local population, which experienced afresh the traumatic loss of 'their' physical identity markers. This was an iconoclash between the local and the global: at present in the World Wide Web live videos of the 2001 destruction of the Buddhas circulate alongside and compete for attention with the 3D models of their virtual and possible physical reconstruction. The *Cui bono* question is not yet answered.

Olivier Cunin's case study points to comparable methods of using 3D models of archaeological ruins in the context of professional building research. However, he defends the critical view of the occasionally devastating effects of releasing virtually surface-rendered, picture-perfect reconstructions to the public, which often

understands these images as authentic and complete. Cunin presents his research on the Angkorian Bayon temple (dated to around 1200 CE) and argues that due to the highly complex, partly inaccessible, and strongly dilapidated nature of the structure, all existing depictions of this temple from the earliest artistic interpretations by Delaporte in 1866 and 1880 onward (compare Baptiste), are as virtual as the hypothetical floor plans and facade elevations of the 1960s that were created on the basis of archaeological building research. Cunin's virtual models comprise various temples from the same stylistic family like the Bayon, Ta Prohm, Preah Khan, and Banteay Chhmar (compare Sanday), and are developed from a kind of element library (compare Nguonphan) that is individualized on the basis of detailed measurements. These models are meant as a series of reconstitutions in order to depict the various stages of the temple's architectural history. They are introduced as "a genuine research tool to validate hypotheses and conduct new investigations, not just produce images for (public) communication." This is why these models are not photographic quality (compare Gruen) but are presented in an abstract mode similar to traditional axonometric architectural drawings. Despite the elitist self-definition of his work, Cunin's temple depictions are today used successfully in various visitors' centres for consumption by the larger public (compare Chermayeff) and create—notwithstanding their work in progress character—a highly suggestive pictorial effect of a temple that is 'once upon a time, in picture-perfect shape.'

The fifth part of this book, *Restoration and Interpretation*: *Of Virtual Models and Living Communities*, introduces a conservationist point of view. It discusses the options for regional/national (Cambodian) human resource building through training and the comprehensive involvement and—ideally—participation of local communities in such projects. **John Sanday** discusses these subjects using Banteay Chhmar, one of the major Cambodian archaeological sites besides Angkor, as his case study. His article is followed by **Jane Clark Chermayeff**'s discussion of direct community involvement initiating a site-interpretation centre within the Angkorian temple of Preah Khan, and local tourism regulation through site-interpretation for the hill temple complex of Phnom Bakheng. **Simon Warrack**'s contribution focuses on the conservation of an important statue inside Angkor Wat that was affected by the direct involvement of the local religious stakeholders—a paradigmatic change from 'archaeologizing (dead) heritage' to the conservation of 'living heritage.'

John Sanday's project on the twelfth-century Buddhist monastic complex of Banteay Chhmar, 175 km northwest of Angkor, has ambitious goals: it draws upon both traditional conservation philosophy and state-of-the-art computer modelling of virtual structure restitutions; it aims at training a local team in conservation technology and site management, providing "involvement" and employment for the local, underprivileged community. From an outside perspective, bridging the gap between global professional research attitudes and the local constraints of the jungle setting, between expensive high-tech virtual reconstruction with heavy electronic data processing and affordable low-tech conservation ("maintaining the marks of the passing of history") with simple equipment and regional manpower

and, finally, between community participation and 'ethnicizing' as a tourism-oriented tableau (compare Falser), seems to be a difficult task. However, as this project (and so many other comparable undertakings) proves, this old-fashioned binary and seemingly incommensurable confrontation can become fluid. In this case the configurations became transculturally entangled in the following ways: the virtual worlds of Banteay Chhmar's face towers and decorated bas-reliefs are today coordinated by a 'national' scholar from the department of archaeology at the Royal University of Fine Arts in Phnom Penh who completed his PhD at Heidelberg University in Germany (see Nguonphan); the so-called 'local' work force was trained at and partly imported from projects at the World Heritage 'Angkor Archaeological Park'; and finally, the supposedly 'traditional' inhabitants inside the project's buffer zone—responsible for organizing picturesque ox-cart temple and jungle tours as part of a 'community based tourism' project from Europe—had, for the large part, simply migrated from other regions of Cambodia to the site.

Jane Clark Chermayeff gives us an overview of two projects inside the Angkor Park that were intended to "change the way visitors and local communities visit, view, and care for historic and natural sites—based in a comprehensive approach to site interpretation as a fundamental component of sustainable conservation." The project coordinators called upon the "power of the people" and defined the following multi-faceted stakeholder community for this cultural built heritage: (inter) national scholars with their historical knowledge; professional conservators of the temples; the surrounding villages to tell living stories (tales, legends, place names) of economic and religious practices at these sites and to help maintain them; and finally—the largest, most powerful, and destructive force in this multi-layered 'local social practice'—the tourists (two million in 2008!) as a short-term visiting human mass that (ideally), when well informed about the daily importance of these living and not purely archaeological sites, would take part in sustaining them through respectful behaviour. In 2005 a workshop was held with international scholars and the Interpretation Advisory Committee of APSARA (the local park protection authority) at the most threatened temple in Angkor, the 'tourist sun set hilltop temple' of Phnom Bakheng. A master plan for both the interpretation and the management of the site was worked out in the form of a "Panoramic Trail" in order to slow down and regulate the tourist flow through several thematic view points around the hill and "conservation in action" panels on the way to the top. This begs the question of whether this new, softer form of directing the tourist flow, along with a newly developed "walkman-head set" for tourist groups, is conceptually comparable to the French-colonial circuit and control system of the old days (see Falser). The second project was an interpretive visitor's centre inside the vast Preah Khan temple complex that is officially preserved as a partial ruin, but is in fact an active place of worship and daily forest harvesting for the surrounding villages. A small gallery hut in a "traditional" design was built to give a forum to the daily life chronicles of residents living near the temple, as well as to present Preah Khan's story as "a place of learning and healing" and not just as a "dead site" for archaeology. How does one respond to the criticism that these visitors' centres, with their photographic panels about the local communities' basket weaving and

fruit tree harvesting activities, are a form of self-stereotyping and indigenizing of the population inside the heritage reserve, which has grown from 40,000 people in the 1990s to some 100,000 today and includes migrants from all over Cambodia and even from outside its national borders? How can we conceptualize the necessary paradigmatic change from 'archaeologized' to 'living heritage'? And where are its limits and perversions if we consider, likewise, that the local protection authority is also constructing (again with help of Western experts) centres of interpretations, including a flowering 1:1-scale model of 'traditional' Khmer housing inside the park and the much larger 'Eco Village of Run Ta-Ek' outside the Angkor Park with families (relocated?) from inside the park. In this latter site, "traditional living, fruit growing, and market activities" surrounded by "traditional wooden houses" (and wind mills as power generators sponsored by a Korean investor) is re-enacted for the ever-growing (and again re-directed?) tourist industry (compare Luco).

The paper by the British stone conservator **Simon Warrack** informs us about the spectacular conservation project of the Ta Reach statue inside the west gate of Angkor Wat in 2003. It was carried out as a by-product of the conservation activities of the German Apsara Conservation Project (GACP). As the last contribution in this fifth part on *restoration and interpretation*, Warrack's case study is meant to serve as a concrete example of "how the archaeological-scientific side of conservation can develop a more integrated and holistic approach, which is compatible with both the requirements of the local stakeholder community as well as the larger heritage community." Interestingly enough, the placement of the statue may have been, along with the completion of the Hindu decorations in the northeast corner of the temple's galleries and the placement of a giant standing Buddha in the inner cruciform gallery, part of a sixteenth-century campaign of restoration and embellishment that was initiated by the Buddhist kings Ang Chan and Satha. The French colonial authorities destroyed the giant Buddha, transferred the cruciform gallery's donated statues to be stored at the Angkor Conservancy in Siem Reap, declared the sixteenth-century repair work a worthless intervention by ignorant monks, and gradually converted (with major structural repair and reconstruction work) the temple's contemporary function as a living Buddhist site into an ancient 're-Hinduized' and archaeologized object of colonial *patrimoine*. Using this early twentieth-century incident as a counter-example, the Ta Reach statue-campaign of 2003 may serve as a suitable case study for a paradigmatic change in conservation methods in the early twenty-first century. In this recent case, the local religious community, including its spiritual leader, were consulted throughout the process of the intended conservation; it agreed with and contributed to all physical interventions on the statue (which were completely aligned with the belief system of the local Nak Ta religion, see Guillou), and celebrated the campaign with a final ceremony. For their part, the Western and local conservation team respected the local religious calendar and guaranteed permanent access to the statue during its conservation campaign. However, the question remains: How would the new and globally acclaimed conservation theory of 'living heritage and tolerance' have reacted if the local stakeholders had opposed any physical intervention on their venerated property? Is the new global heritage dogma of tolerance strong enough to

let a major piece of art in the park 'decay and fall apart' because of the wishes of the local religious community?

The sixth and final part of the book is titled *Memorializing Archaeology: Archaeologizing Memory* and comprises three contributions on the following commemorative strategies employed at archaeological sites: (a) how totalitarian political regimes and religious belief systems memorialize archaeological heritage for and within their ideologies; and (b) how local populations during regimes (and after regime changes) react to and live within archaeological heritage and eventually adopt counter-strategies for their daily living, cultural identity, and collective memory. **Pierre Pichard** discusses the development of (post)colonial and totalitarian strategies on the Pagan site in present-day Myanmar, which has changed from an entity of colonial archaeology, to a contemporary site of religious merit-making through building reconstruction, and finally to a "pleasure park" for the ruling military regime. **Fabienne Luco** explores the agricultural land use strategies of the local communities in Angkor. These can be seen as a vernacular continuation of the civilizing landscape patterns of ancient Angkor, which do not accord with the official model of an 'archaeological' park. And finally, **Anne Guillou**'s contribution discusses the macabre "archaeological procedures" that have been implemented in Cambodia between 1975 and the present day: the mass graves produced during the Khmer Rouge genocide, the Vietnam-backed regime's memorial-making that deployed the unearthed and explicitly exposed human remains of the Khmer Rouge victims, and the post-traumatic coping strategies of the current local population drawing upon the Neak Ta belief system of powerful, and in this case, painful sites of violent death.

Pierre Pichard's contribution on Pagan in today's Myanmar tells a story that is in many ways comparable to that of Angkor. Like Angkor, the temple city of Pagan was captured by Asian enemies in medieval times and was never totally abandoned. It was re-discovered as an archaeological site under the British colonial administration and 'restored' through the aegis of the Burmese variant of the Archaeological Survey of India (compare Weiler and Sengupta). This conceptual model of a purely 'archaeological' entity of Pagan under a colonial restoration mission survived and was even reinforced after the earthquake of 1975. With a priority list established by the department of archaeology and with the assistance of UNESCO, selected temples were consolidated and a master plan was drafted (but not signed) for the whole area around 1990. Cambodia's 'earthquake' also occurred in 1975, but it was of an entirely ideological nature since the Khmer Rouge terror and the subsequent Vietnamese occupation produced a cultural *tabula rasa* for the country and the Angkor site survived without any larger physical iconoclasm against the temples. With the regime change in 1990 and with assistance from the UN, a management plan for Angkor was accepted *after* its hasty inclusion as a UNESCO World Heritage Site. Shortly before this, national uprisings in 1988 brought a military junta to power in Burma and an internal civilizing mission brought about the relocation of thousands of inhabitants from the archaeological arena of Pagan (as also happened in Angkor, see Luco) forming a kind of "Blitzkrieg archaeology" (Pichard quoting a Burmese historian) on the temple sites. At Angkor, as at Pagan,

UNESCO was on the spot establishing, or at least subconsciously perpetuating, Western concepts of conservation. In Pagan, against international guidelines, the government launched a beautification (i.e. full reconstruction) programme of the decayed and, in some cases, totally lost temple structures, which was financed by public donations from the country's population, from Burmese expatriates and Buddhist associations, and from the military generals themselves. It seems that this vision of a perfect and spotless temple city, inspired by picturesque notions that went back to colonial contexts (compare Weiler, Sengupta, and Baptiste), was later amalgamated with Buddhist notions of merit accumulation through donations for temple reconstructions, and eventually formed part of the strategies of self-commemoration enacted by the leaders of the ruling regime. In Angkor, the donations for the often over-restored temples continue to come in to this day through various international conservation projects from Japan, China, Indonesia, USA, France, Germany, Italy, Hungary, and others. However, with its 2,000 recreated, homogeneous and fake-looking temple structures, Pagan is without a doubt the opposite of Angkor: from the theoretical perspective of an internationally accepted conservation dogma it is a "Disneyland" and therefore not listed as World Heritage. Nevertheless, it is interesting to note that the new and historicizing structures of the museum and the so-called 'royal palace' at Pagan might have even less reinforced concrete inside their structure than the newly opened, formerly medieval Bapuon temple in Angkor, which was reconstructed (and not restored?) by the French mission. Pichard ends his paper with the interesting hypothesis that, for primarily religious reasons, Pagan is an "anti-Angkor." He mentions that the Pagan temples were always Buddhist and therefore continuously venerated as Buddhist sites of worship and "a field of potential merit," whereas many (but certainly not all) Angkorian temples were consecrated as Hindu temples. The implicit conclusion that this fact created a discontinuity of veneration or a rupture for the Buddhist population might end up employing the logic reminiscent of French colonial strategies of 're-Hindu-izing' and 'archaeologizing' (compare Warrack). In reality, and despite 150 years of 'archaeologizing' efforts from colonial, postcolonial, international, and nowadays even local institutions, the temples of Angkor, along with neighbouring wats and other sacred places, form an all-encompassing sphere of social practice that cover the religions of ancient Hinduism, actual Buddhism, and the indigenous Nak-Ta cult (see Warrack and Guillou).

This notion of "Angkor as a palimpsest" is a direction also followed by **Fabienne Luco**. In her paper she tells of how the inhabitants and monasteries of the inner Angkor zone managed—despite several relocation campaigns, beginning with the French colonial authorities up to the current attempts by Cambodian protection authorities—to (re-)capture and (re-)cultivate the "empty/emptied spaces" between the old stone temples on the basis of religious interconnections and the topographical remains of the ancient system of water management, rice farming, and circulation. She describes the discontinuities on the Angkor site that were produced by the changing regimes with their enforced restrictions of land and heritage development policies inside the protected archaeological zone, the

pressure on the local people to become part of a folkloristic tableau for international mass tourism, and the constant and continuing effort of the French to 'archaeologize' Angkor (Luco calls it "fossilization") into a controllable heritage reserve (compare Falser). But the monasteries and the eighty-five local villages, with a combined population of some 100,000 inhabitants on the extended site of Angkor covering 400 km^2, inscribed and will always inscribe new physical and social additions onto this landscape of multi-layered cultural memory to create the "Angkorian palimpsest."

Related to Luco's approach fusing memory and landscape, **Anne Guillou**'s contribution closes this book with a thoughtful analysis of the tragic events in Cambodia's recent history. These are placed within this last part's topoi of *archaeologizing memory* and *memorializing archaeology*. The genocide realized by the totalitarian Democratic Kampuchea regime (1975–1979) that saw at least 1.7 million victims dumped into mass graves all over the country, adds a horrifying new layer of human remains and traumatic memory onto the stratigraphy of Cambodia's landscape. In the 1980s the Vietnamese-backed People's Republic of Kampuchea instrumentalized the Khmer Rouge genocide as its own *raison d'etre* through a programme of commemoration that was carried out with help of museography specialists from Eastern Europe. Sites of torture (like the S-21 prison in Phnom Penh) were converted into museums, and mass graves were exhumed and their human remains publicly exposed in at least eighty state-sponsored, open-air memorials countrywide (like Choeung Aek near Phnom Penh). This macabre process of politically motivated 'archaeology' came to an end after the change of regime around 1990 and these memorials fell into decay in a period of "suspended historicity" (Guillou). It is the popular Cambodian perception "that the dead have merged with their natural environment," but the victims of genocide—a bad death—haunt the landscape as ghosts and become part of powerful places that are associated with the ancestral spirits called *neak ta* (compare Warrack). Through ceremonies and by planting rice fields and fruit trees over mass graves and remembered sites of murder, the local population renders these places progressively powerless. Anne Guillou calls this practice "the villager's living or sacred archaeology of mass graves."

This last contribution seems, at first glance, to be a far cry from the earlier discourse on the scientific archaeology, conservation, and computational models of built cultural heritage. But the links are closer than one might think. Earth, as Guillou tells us, is a major element in the Khmer religious belief system. That the ancient artistic and sacred temple building in Angkorian times was based on an equilibrium of negative and positive earth volumes (i.e. dykes and canals vs. high-rise architecture) is a fact that is certainly well known to Western archaeologists working at the site. From this perspective, temples covered the whole ancient Angkorian landscape and the earth was perceived to be enriched with this culture. This can be related to Guillou's perception that the Cambodian soil "is enriched with fragments of old statues and artefacts, old and new, in some cases buried during times of war in order to prevent them from destruction and robbery." With the incorporation of human corpses (the *physical-archaeological remains*) and

psychological trauma (the *mental remains*) from one of world history's most horrifying incidents into their *local social practice* and religious belief system, Cambodians, as Guillou puts it, are symbolically indicating that the life cycle is closing and moving again towards a better and peaceful future. She states: "By practicing archaeology in its largest sense—lay and popular as well as professional archaeology—Cambodia is able to plait a string between its past and its present." This observation challenges our working hypothesis that Western archaeology—and lately its applied tool in the virtual model making of built heritage—was and still is a means of decontextualizing a culture's past from its contemporary practice.

To what extent did the logic of rational sciences and its all-encompassing concepts of cultural heritage—the recurring picturesque depictions of the 'other' and aesthetic ideas and virtual models of its physical, in our case primarily 'archaeological,' products—sufficiently consider local social practices? How helpful is the binary between popular ('Eastern') and official ('Western') archaeology? Such an opposition brings into play a certain critique of globalization wherein the local is identified as the site of 'authentic' culture, a space of resistance to a hegemonic and homogenizing global. Yet this binary is as essentializing and simplistic as the alleged cultural homogenization of the global it opposes. The case studies discussed here have brought to light the fractures within the locality, which make it a space frequently torn apart by conflict and conflagration over memories and their tangible sites. At the same time there can be no purely 'global' culture that is disconnected from local traditions: market forces, practices of translation, and the modern media that cut across the world are inflected by forces that are national, regional, and local in the same way that the metropolis of the nineteenth century was a place of encounter and the spectacular staging of the local, distant, and exotic through world fairs. The essays in this collection are an attempt to understand the world as a complex of transcultural entanglements by paying closer attention to the multiple layers and hierarchies built within these relationships, and by finding a language to define the morphologies of interaction, appropriation, and transformation (Falser/Juneja 2013).

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Part I
Archaeologizing Heritage I: India Between the Manual and the Picturesque

A Conservation Code for the Colony: John Marshall's Conservation Manual and Monument Preservation Between India and Europe

Indra Sengupta

Abstract This article addresses the framing of the rules of preservation of ancient buildings in colonial India and the resulting code of practice that the first Director-General of Indian Archaeology, Sir John Marshall, published in 1923. The code or John Marshall's *Conservation Manual* was designed as a prescriptive colonial text, setting down stringent rules for the practice of monument preservation in a colony, and thus constituted a text of authority. Yet, it was also the product of the kind of tension that was implicit in the operation of colonial state power in India, which resulted from the need to reconcile ideas produced in the metropolitan culture of contemporary Britain with local pressures on the ground in the various regions and localities of India. The intentionality of the text that thus emerged must therefore be understood in the context of the multiple audiences that it sought at the same time to address. By examining the context in which the *Conservation Manual* was conceived and finally produced, that is, from the early years of the twentieth century until its appearance in 1923, this paper hopes to contribute to a clearer understanding of the problems of the preservation of monuments, especially religious structures, in colonial India during two decades of the most intense legislation and regulation of ancient monuments.

Keywords John Marshall • Conservation Manual • Archaeological Survey of India • Cultural heritage • Colonial India

Birth of a Colonial Conservation Code

This is the story of a text, an authoritative text produced by colonial policy makers in early twentieth-century India. Specifically, it is the story of an officially produced handbook, consisting of seventy-odd pages, which despite its size came to form the

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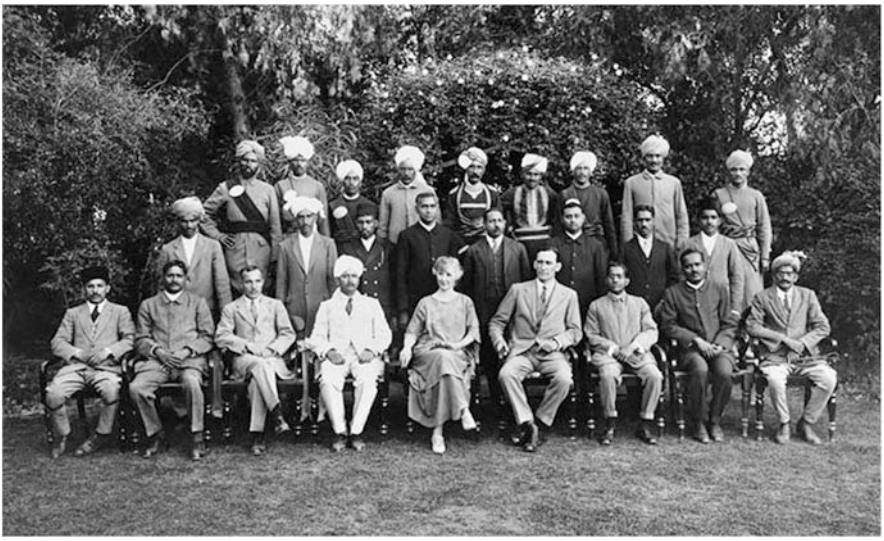


Fig. 1 John Marshall and his wife Florence with the Staff of the Archaeological Survey of India, 1925. (The Alkazi Collection of Photography)

basis of the state-driven monument preservation and general archaeological policy in colonial India. This paper examines how this code of practice, the *Conservation Manual*, written by John Marshall, the Director-General of the restructured Department of Archaeology or the Archaeological Survey of India,[1] and published in 1923 was conceived as an authoritative text on monument preservation in colonial India (as it remains to this day), and how it sought to resolve the tension between laying clear, fixed, and universal rules of the principles and practice of preservation while allowing enough room for local conditions. In other words, this paper will examine the ambivalence inherent in the authority of colonial rule, as on the one hand colonial officers grappled with the task of enforcing the authority of the colonial state on the philosophy, principles, and practice of heritage making in India, and on the other, justifying its policies to the various watchdog groups in metropolitan Britain, who often tended to perceive the colonial rulers of India as traditionalist and behind the times (Fig. 1).

In December 1906 John Marshall, the Director-General of Archaeology of India wrote an impassioned letter to Viceroy Lord Minto defending the work of his department, which ended with the following words (also quoted above):

> Surely the judgment of [. . .] men arrived at on the spot is worth a great deal more than the dogmas of a Committee, the majority of whose members have probably never set foot on Indian soil! (John Marshall, Director-General of Indian Archaeology to Duncan Smith, Secretary to the Viceroy, 28.12.1906. Archaeological Survey of India (henceforth ASI), Archaeology File no. 202, 1906).

[1] The Archaeological Survey of India came into existence in 1861, but had a chequered history until its final establishment in 1873. The first Director-General was Alexander Cunningham. For a general history of archaeology in colonial India (Singh 2004; Chakrabarti 2001; Roy 1996).

The committee in question was that of the London-based Society for the Protection of Ancient Buildings[2] and the occasion was the rather gentle rebuke that the society had levelled at the Government of India and its archaeological department for not adhering to the principles of preservation of monuments that the society had been campaigning for in Britain and Europe since it was founded in 1877. Furthermore, the SPAB reminded the Government of India of the lack of a code of practice for the preservation of ancient buildings in India. By 1923, when his *Conservation Manual* for India was published, John Marshall had made his peace with the society: in the preface to the manual he thanked it for its "friendly interest" and "numerous useful suggestions" and in the manual itself incorporated the main ideas of preservation that the society had been propagating in Britain and Europe since its inception (Marshall 1990, ii). What made John Marshall change his mind so dramatically about the society? And why did he react so strongly to it in the first place? Engaging with these questions will, I hope, help us to understand some of the fundamental problems that colonial archaeological preservation in India was confronted with.

The principles of preservation and monument making, as they are known in India today—that is, state-driven, bureaucratically controlled, and centralized—were introduced under British rule. Throughout the entire period of the rule of the East India Company from 1765 to 1858 little more than sporadic attempts were made by the company to preserve historical structures. These efforts were largely limited to the heartland of the former Mughal Empire in Delhi and Agra and, as recent research suggests, had much to do with the efforts of the company to legitimize its rule as the natural successor of the Mughal rulers of India (Etter 2011). The real impulse of a frenetic phase of state-driven conservation came with the appointment of George Nathaniel Curzon, Marquess Curzon of Kedleston, or Lord Curzon (1859–1925) to the office of Viceroy of India, which he held from 1899 to 1905. As has been adequately documented, Curzon not only had a deep interest in preserving India's architectural heritage, he saw this as the fundamental, divinely ordained duty of the colonial government and thus outlined a clear line of archaeological policy to be pursued by the state.[3] In addition to using India's pre-colonial, Mughal public buildings to stage elaborate imperial rituals of state power, and vigorously insisting on the employment of the so-called Indo-Saracenic building style in order to create the illusion of British rule in India as a natural and legitimate successor to Mughal rule,[4] he also radically restructured the department of archaeology. This last included a

[2] Henceforth referred to as SPAB.

[3] See, for example, the many speeches of Curzon on the subject, both in India and in Britain. Probably the most famous, and certainly most often quoted of these is the speech he gave to the Asiatic Society of Bengal in 1900, in which he rather grandly proclaimed that India's ancient, religious architecture was "a part of the heritage which Providence has committed to the custody of the ruling power." Lord Curzon, Speech before the Asiatic Society of Bengal, 7 February 1900 (Curzon 1906).

[4] On Curzon's attempts to use India's architectural heritage for staging imperial power (Metcalf 2002).

centralized department of archaeology and appointing a Director-General of Archaeology who would be responsible for this centralized policy and its implementation.[5] The man chosen for the position was a young scholar of the classics and archaeology, aged twenty five and with no previous experience of, or family history related to, India. Nevertheless, he was the personal choice of the viceroy, who wished to entrust the task of India's monument management to a scholar of the classics and European archaeology rather than a philologist and orientalist. That man, of course, was John Marshall.[6] Curzon also dramatically increased the government's expenditure on archaeology and succeeded in passing the Ancient Monument Preservation Act in 1904.[7]

Despite these measures, what remained unclear was the precise way in which preservation should be undertaken, which as late as the early twentieth century remained ad hoc and unregulated. Curzon's early response to the way in which the colonial state in India went about the task was unequivocal: "[. . .] there is neither principle nor unity in conservation or repair, while from time to time horrors are still committed that make the student shudder and turn grey" (Roy 1996). The appointment of John Marshall, with his experience of working in Crete, Turkey, and Greece, was expected to change all this. Marshall himself tried to define the task that the Director-General of Archaeology in India should undertake:

> the most important of his functions is to secure that the ancient monuments of the country are cared for, that they are not utilized for purposes which are inappropriate or unseemly, that repairs are executed when required, and that any restorations, which may be attempted, are conducted on artistic lines. (Chakrabarti 2001, 122)

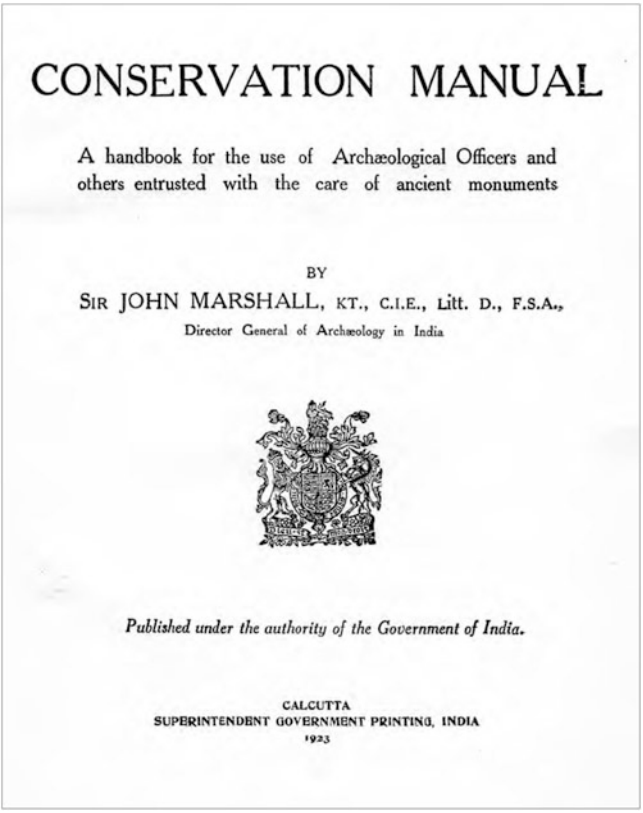
But what were the principles of preservation that Curzon and Marshall were referring to? Curzon's choice of the terms "conservation or repair" is an unwitting reference to what was a central issue in the debate on preservation that had been going on in Britain and Europe for the better part of the nineteenth century, i.e. how were the material remains of the past to be presented to the present? Were they, with the help of modern technology, to be restored to their original form? Or should they be conserved in the state of decay or ruin that they were in, in order to preserve their historical authenticity? These were the questions that John Marshall sought to address in his *Conservation Manual* and in his dealings with the SPAB (Fig. 2).

Long before the manual was published, in 1906 John Marshall brought out a shorter and less ambitious version called *Conservation of Ancient Monuments:*

[5] For the restructuring of archaeology by Lord Curzon (Chakrabarti 2001; Roy 1996).

[6] On the background to Marshall's appointment (Lahiri 1997).

[7] For instance, in 1898–1999 the total expenditure of the Government of India and all provincial governments on archaeology was a total of £7,000 a year; by 1904 this had gone up to £37,000. IOL, IOR/L/PJ/6/674 File 803, President of the Council of the Governor General, or Viceroy Curzon, 18 March 1904, Proceedings of the Legislative Council, Ancient Monuments Preservation Act, Act VII, 1904, Judicial and Public Dept.



CONSERVATION MANUAL

A handbook for the use of Archæological Officers and others entrusted with the care of ancient monuments

BY

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Published under the authority of the Government of India.

CALCUTTA
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1923

Fig. 2 Title page of the first edition of John Marshall's *Conservation Manual*, 1923. (Source: Marshall 1990, title page)

General Principles for the Guidance of Those Entrusted with the Custody of and Execution of Repairs to Ancient Monuments. In this pamphlet Marshall spelt out the precedence that preservation should take over restoration. "Officers charged with the execution of the work of repair," Marshall wrote, "should never forget that the reparation of any remnant of ancient architecture, however humble, is a work to be entered upon with totally different feelings from a new work or from the repairs of a modern building. Although there are many ancient buildings, whose state of disrepair suggests at first sight a renewal, it should never be forgotten that their historical value is gone when their authenticity is destroyed, and that our first duty is not to renew them but to preserve them" (Marshall 1906, 3–4).

It is fairly evident from these remarks that the principles of preservation of ancient structures that Marshall was articulating stemmed from a philosophy of preservation and heritage management that had become dominant in Victorian

Britain and large parts of Western Europe by the late nineteenth century.[8] With the growing influence of historicism in art and architecture in Britain and Europe from the middle of the nineteenth century onwards, severe criticism came to be directed at the often arbitrary reconstruction of architectural styles of the past that fell under the banner of restoration. Led by influential intellectuals and thinkers such as John Ruskin and William Morris the anti-restoration movement came to champion the historical specificity of the production of a work of art or an ancient building. In his classic work on architectural conservation, *The Seven Lamps of Architecture*, Ruskin defined the seven guiding principles of architecture, emphasizing the innate historical worth and importance of historical buildings as a document of human history. Building on this Ruskin argued that any restoration or reconstruction of an old building, however faithfully executed, was still tantamount to its destruction: "Do not let us deceive ourselves in this important matter; it is impossible, as impossible as to raise the dead, to restore anything that has ever been great or beautiful in architecture" (Ruskin 1989, 194).[9] By the 1860s Ruskin's ideas had developed into a full-fledged, influential anti-restoration movement that emphatically promoted the conservation of ancient buildings in order to retain their historical character and their value as material traces of the past, which was essential for the study of human achievement in the past. While not unchallenged, the conservation movement began to exercise increasing influence on prominent architectural and antiquarian bodies of Victorian England, such as the Society of Antiquaries and the Royal Institute of British Architects (RIBA). In 1877 at William Morris's initiative the movement got its own learned society, the Society for the Protection of Ancient Buildings, also known as the Anti-Scrape Society. The SPAB was rooted in the Arts and Crafts movement, and came to stand for a particular notion of aesthetics which held that the value of historical buildings lay in their age, in the continuity of material over time, and that the aesthetics of old structures was to be found in their age.[10] In the manifesto of the SPAB, written by William Morris, he made a plea to the architects of the day who were wedded to the principle of restoration:

> [. . .] we pray them to remember how much is gone of the religion, thought, and manners of time past, never, by almost universal consent, to be restored; and to consider whether it be possible to restore those buildings, the living spirit of which, it cannot be too often repeated, was an inseparable part of that religion and thought, and those past manners (Society for the Protection of Ancient Buildings 1877).

Against the prevailing trends of Gothic Revival and energetic church restoration undertaken, especially by the parishes and defended by restoration architects such as George Gilbert Scott as befitting places of worship in the mid-nineteenth century,

[8] For a recent study of how such ideas established themselves in Britain and Western Europe (Swenson 2007).

[9] For a discussion of Ruskin and architectural conservation (Jokilehto 2009, 174–182).

[10] For an account of the beginnings of the SPAB and William Morris' role in its foundation and early years (Miele 2005).

younger architects, antiquarians, and preservationists, usually members of the SPAB, began to militantly assert that the worth of old buildings and structures lay in their age and beauty. Some architects, such as John James Stevenson emphasized that an important purpose for engaging with old buildings was antiquarian research and that churches, for example, were merely records of history.[11] So steady was the growth in influence of the preservation movement that by the end of the nineteenth century opposition to restoration or any attempt to 'de-historicize' ancient buildings had become the most prevailing trend in thinking about built heritage.

The Colonial Setting of a Victorian Debate

What did these developments in Britain have to do with the context of colonial India, with John Marshall and his *Conservation Manual*? Starting from the Romantic nostalgia for ruins in Europe after the French Revolution to the passionate attempts of the SPAB in Victorian Britain to preserve, rather than restore, ancient structures, the preservation movement, as we have seen had a very European history. It was rooted in the specific cultural concerns of nineteenth-century Europe regarding modernity and history, the relationship between past and present, and the consequent relationship between cultures and their monuments and ruins.[12] The interest of British artists, scholars, and statesmen in colonial India—beginning with the rule of the East India Company—and in India's ancient architectural structures and ruins was not unaffected by these cultural currents. The prodigious works of art depicting architectural ruins from the early days of British rule are indicative of the way in which Indian landscapes were being drawn into the contemporary Romantic notions of the picturesque,[13] which consisted of the artistic fascination for ruins as the symbol of the 'pastness' of the past and the construction of nostalgia for a past that was lost to the present.[14] The landscapes of William Hodges or the uncle and nephew team of Thomas and William Daniell are evidence of this fascination. Yet, as scholars such as David Arnold and Michael S. Dodson have pointed out, the context of colonial rule imbued these notions of the picturesque in relation to India with another, more sombre, meaning (Dodson 2010). Landscapes of ruins and

[11] One can get an idea of the defining of positions amongst the architects of the time in an essay written not many years after Reginald W. J. Davies had settled the issue. The essay was entitled "The preservation of ancient monuments" and was awarded the RIBA Silver Medal for an Essay in 1913 (Davies 1913).

[12] Historians such as Peter Fritzsche and David Lowenthal have very skilfully conceptualized the renegotiating of the relationship between past and present in European culture after the French Revolution (Fritzsche 2004; Lowenthal 1985).

[13] Editor's note: Whereas Sengupta's essay analyses a prescriptive colonial text in from of a manual to transform (translate) Indian sites into heritage sites under colonial rule, the contribution of Weiler in this volume discusses the 'archaeologizing' transformation (translation) of the same sites into 'picturesque texts' through the medium of photography.

[14] For an analysis of British artists in India and the picturesque (Tillotson 2000, esp. 37–57).

ruination could, in the colonial context, also serve as a metaphor of general decline and death, and thus serve as justification for colonial rule as the facilitator of progress in India (Arnold 2005, 74–80).

> [. . .] When transferred to a nascent colonial setting, the aesthetic of the picturesque—and most especially the representation of architectural ruination—can arguably also be interpreted as a call for British interventionism and as a defense (sic) of colonial governance through a pictorial invocation of *terra nullius* or perhaps Asian civilizational degeneration. (Dodson 2011, 128)

Thus, historicism and the picturesque could serve as an effective tool for the justification of colonial rule in India. Out of this emerged an authority over India's fate, and indeed its past, that the colonial state and its various officials vested in themselves. Even academic histories of Indian architecture, such as the study by James Fergusson from the mid-1840s to the 1870s, reveal the responsibility that colonial scholars and officials felt to document a history and tradition threatened by decay and extinction.[15] Finally, as is well known, such an understanding of India's past could be used discursively to argue, as the Viceroy Lord Curzon did in his public speech of 1900, that it was the divine dispensation of colonial rule to assume custodianship of India's past and its architectural heritage.

Even a brief glance at the instructions and the philosophy of preservation spelt out in the manual written by John Marshall for India reveals the close attention that Marshall had been paying to the discussions on the subject in late Victorian and Edwardian Britain. In their repeated reference to conservation, repair, and restoration, India's Viceroy Lord Curzon and its Director-General of Archaeology, John Marshall—both of whom trained in the classics and were well acquainted with archaeological and preservation work in Europe—were addressing a debate that had been central to thinking on heritage and preservation in Europe since the late eighteenth century. Indeed, the highest officials of India's archaeological department, certainly from the late 1890s onwards, were made aware of these debates in Europe: the files of the archaeological department, kept in the Archaeological Survey of India in New Delhi today, reveal copies of printed and commented extracts from *The Care of Ancient Monuments,* one of the most influential tracts on conservation in early twentieth-century Britain written by the renowned proponent of preservation and state intervention in the management of built heritage, G. Baldwin Brown, professor of art at Edinburgh University. These extracts, designed to serve as guidelines for conservation, were printed and distributed to the officers of the archaeological department as early as 1905—the very year of its publication. The first lines of the work betray its historicist agenda, which forms the basis of an invocation of what we can instantly recognize as modern-day practices of monument making:

> The subject of this book is the Care of Ancient Monuments, and the term 'monument' embraces all old buildings and other memorials of bygone days. These are the heirlooms from the past and appeal to the piety and patriotism of the present. (Brown 1905, 3)

[15] For a more in-depth discussion on James Fergusson's work (Juneja 2001).

Thus, there seems to be enough evidence to indicate that John Marshall was in fundamental agreement with the SPAB on the philosophy and principles of preservation. Why then did he react so angrily to the society's note to the Government of India in 1906, referred to at the beginning of this paper? The occasion was the SPAB's response to the way in which the care of ancient monuments in India was conducted in colonial India. Responding to the first printed report of the ASI on the care of monuments in 1902–1903, the society pointed out what appeared to be some glaring contradictions in the policy of the colonial Government of India. With reference to specific projects for the care of historic buildings that the colonial state had undertaken the society pointed out that, while on one hand the Archaeological Survey's efforts to adhere to the principles of conservation advocated by the society were laudable, they were lacking in consistency and, in practice, the survey was not averse to resorting to restoration. In the case of the throne of the Mughal emperor, Shah Jahan at Delhi, for instance, the survey expressed an eagerness to acquire from Europe the stones that were missing from the throne and to have the panels behind it executed in Florence; likewise, a temple had, by the survey's own admission, been restored with the help of a painting by Daniell. Such attempts, declared SPAB, were an "unnecessary falsification of history" (SPAB 1906)[16] (Fig. 3).

In a final rebuke the society pointed out the need for a code of "clear and definite instructions regarding works of repair and preservation" and for "clearest and most rigid instructions on this point" (SPAB 1906).[17]

John Marshall's response to this, as we have seen, was verging on irate. Although Marshall was known to be impatient and occasionally highhanded,[18] he was not merely irritated at being put in his place, as it were, by the one of the most influential bodies of the preservation movement in Victorian Britain. The reasons for his irritation lay with Marshall's understanding of the specific conditions in India, conditions that were less related to natural factors such as climate (although this too played a part), than to the political considerations and moral dispensation behind colonial rule. In his response to the comments of the SPAB, addressed to Lord Minto, the new Viceroy of India, Marshall wrote:

> [...] there are very essential differences between Saracenic monuments on the one hand, and Buddhist, Jain and Hindu on the other, and these differences must inevitably reflect themselves in the character of the repairs executed. [...] restoration has been confined almost entirely to Saracenic structures, and the policy of restoring these monuments has been definitely and deliberately accepted by the Govt for many years past. [...] it appears to me that the Society must be totally ignorant of the conditions affecting monuments of India, and that it has failed to comprehend the real meaning of its petition (John Marshall, Director General of Indian Archaeology to Duncan Smith, Secretary to the Viceroy, 28.12.1906. ASI, Archaeology File no. 202, 1906).

[16] Letter from Thackeray Turner, Secretary to the SPAB, 12 October 1906. ASI, Archaeology File no. 202, 1906.

[17] Ibid.

[18] Nayanjot Lahiri has addressed Marshall's impatience with colleagues and staff and his difficulties in dealing with them (Lahiri 2000, esp. 101–104).

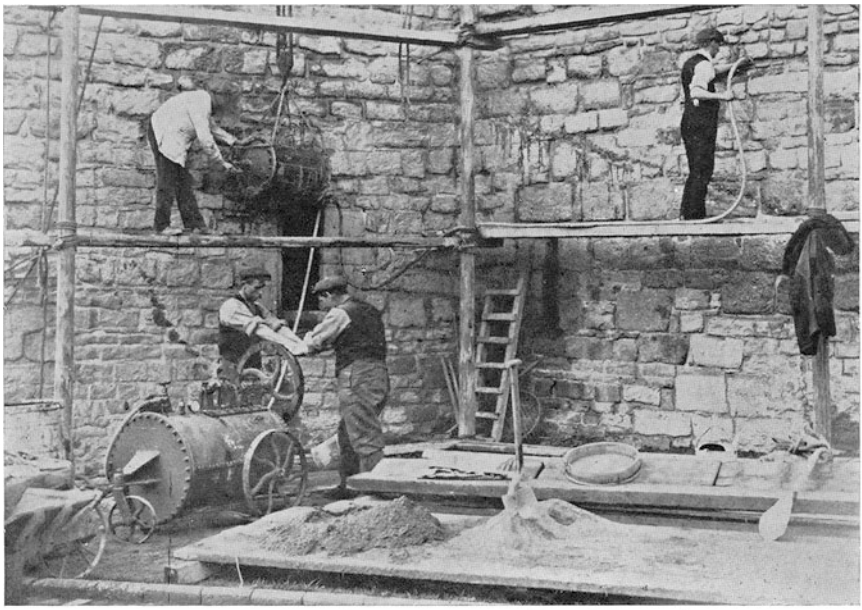

PLATE XI.

GROUTING MACHINE AT WORK (SEE PARA. 147).

Photo.-engraved & printed at the Offices of the Survey of India, Calcutta, 1922.

Fig. 3 *Men at work:* This picture, taken from Marshall's *Conservation Manual*, entitled *Grouting Machine at Work* indicates how closely Marshall followed the techniques of building construction in Britain, from Marshall's *Conservation Manual* 1923 (Source: Marshall 1990, plate XI)

Marshall then went on to refer to the fabled restoration of the Taj Mahal, pointing out the difference that restoration—and not protection—had made to the monument. Finally, he concluded with a rather curious argument:

> These imperial buildings of the Mughals are valuable to India not merely as antiquarian relics. They are an important asset in the education of the people, and judicious restoration has greatly increased their value in this respect. They are, moreover, a national heritage, which the Indian people have a right to expect will be preserved to posterity as something more than mere interesting ruins. The Taj Mahal is still the resting place of the great Emperor and Empress for whom it was erected, and as such it deserves to be maintained in all its original splendour; while the palaces and pavilions of the Mughals [. . .] still serve on occasion as the noblest and most imperial settings for the highest functions of the State (John Marshall, Director General of Indian Archaeology to Duncan Smith, Secretary to the Viceroy, 28.12.1906. ASI, Archaeology File no. 202, 1906) (Fig. 4).

It is difficult not to understand such statements as the rhetoric of imperial rule and the language is unmistakeably that of the discourses of colonial power in India. Marshall's words resonate with notions of guardianship entrusted to the colonial power of India, thus echoing the language used by Curzon to describe his

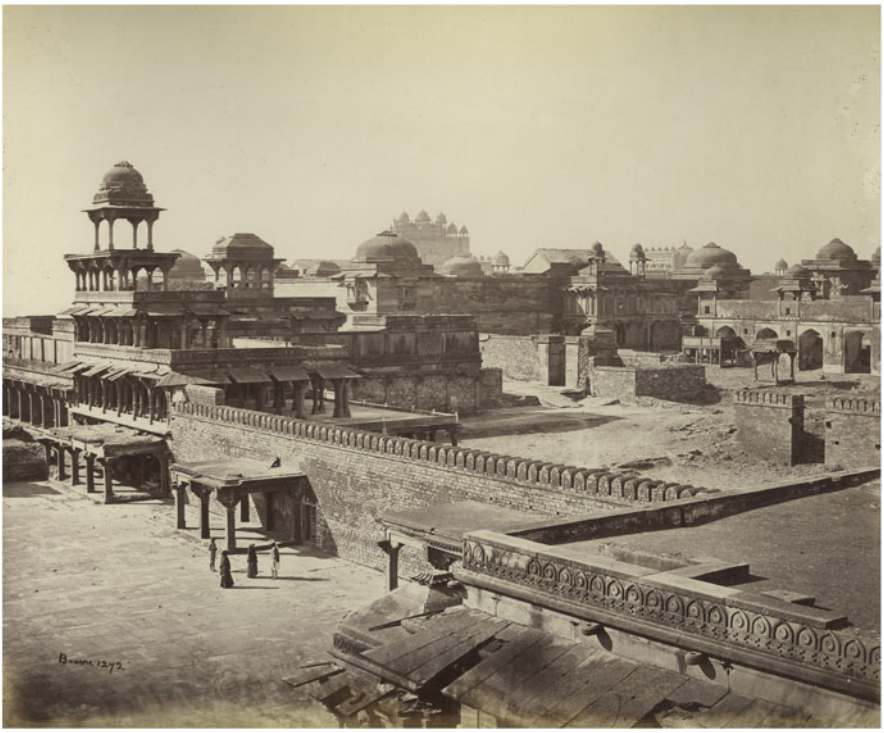

Fig. 4 Fatehpur Sikri in the 1860s. Mughal monuments provided the rationale for departing from preservation norms established in Britain in the second half of the nineteenth century. Photograph taken by Samuel Bourne of the famous photographic studio Bourne & Shepherd in colonial India. (RIBA Library Photographs Collection)

government's duty to preserve and maintain India's architectural heritage. The ready use of religious-sectarian categories to define and classify architectural typologies is as evident as in Curzon's own programmatic speeches on the role of the colonial state in preserving India's monuments. Furthermore, the significance of Marshall's reference to Mughal structures in the context of the debate on preservation was no coincidence: since the early years of company rule, much attention had been paid to the repair of Mughal structures; research has shown that this was a systematic policy, thus indicating that colonial rule was always aware of the symbolic authority of Mughal rule and that from the early days of company rule particular importance had been attached to the upkeep of Mughal structures. Scholars such as Anne-Julie Etter have explained this as a conscious choice on the part of early colonial administrators, driven by the political imperative to be seen as both the allies as well as the natural successors of the Mughal rulers of India (Etter 2011).

Universal Heritage, Local Rules

However, imperial rhetoric and concerns about legitimation of rule alone are not adequate to understand the full significance of Marshall's words. In the context of the preservation of historical monuments Marshall was using the case of India to engage with the universalist and historicist claims of dominant metropolitan and European discourses on preservation. He was arguing in favour of exceptions to the stringent rules that the SPAB was trying to spell out for the protection of ancient buildings, and in doing so, was calling into question the historicist claims of built heritage that the SPAB was trying to universalize. By holding up the example of Mughal structures, for example, as something that was much more than merely 'antiquarian relics' or 'interesting ruins' and in fact replete with political and cultural meaning that was rooted in the present, Marshall was precisely challenging the notion of time, of the clear line between the (living) present and (dead) past that characterized European 'modernist' thinking on monuments and ruins, and which the preservation movement and the SPAB had championed in Britain. Thus, Mughal structures, although belonging to a time before British rule in India, were still part of the recent cultural memory of India and thus a part of India's living present. This position was not unrelated to the guardianship role that colonial rule ascribed to itself in the late nineteenth century (i.e. the British as guardians of India's past) and served to legitimize colonial rule. Nevertheless, in the larger context of a debate on preservation and heritage that was trying to formulate universal laws and practice, Marshall was using the specificity of the local and the regional as a counter-argument to the universalist claims of the SPAB.[19] Therefore, in terms of the care of Mughal structures, as Marshall seems to have convincingly explained to Christiana Herringham, the noted Edwardian art copyist and member of SPAB who visited India in 1907, it was not only possible to successfully undertake restoration without compromising authenticity or historicity, it was in fact desirable—and possible—since the building tradition of the artisans of Mughal buildings continued to survive unbroken under British rule. Muslim artisans in contemporary India, he appears to have explained, were proof of this living tradition, as they continued to employ the same building techniques used by their forebears in the heyday of the Mughal Empire. By the time she returned to England, Christiana Herringham was fully convinced by Marshall's argument. In her report on her trip to India, which she sent to the SPAB, she wrote the following:

> The principles that actuate Mr. Marshall and his staff are to save all they can—but to introduce no imitative work in all that regards ancient work belonging to any cult or nationality, but the buildings of the Muslims of the Mogul Empire are sometimes treated differently. There has been no break in the traditions—the old workshops go on, and where pernicious European influence has not penetrated, native building is not much different

[19] Editor's note: For a theoretical discussion of the local, global, and universalist, see this volume's introduction.

Fig. 5 Restoration or conservation? Group of plaster cast moulders at work at the Qutb Minar and Quwwatu'l-Islam mosque complex, 1872. Photograph taken by Charles Shepherd of Bourne & Shepherd. (RIBA Library Photographs Collection)

> now—and these buildings [...] can be repaired as their original builders would have repaired them [...] (Extract from letter of Christiana Herringham to SPAB. *Annual Report of the SPAB*, 1907) (Fig. 5).

It is precisely this kind of thinking that was behind Marshall's rejoinder to the SPAB's criticism a year earlier where he stated that India lacked a code of practice for the protection of ancient monuments. He argued that it was difficult, if not impossible, to frame a single, coherent set of rules and practice for the conservation of ancient structures in India. He wrote to the society:

> In dealing with Indian monuments there are many political, religious and other considerations to be taken into account which may not be appreciated by those unfamiliar with the local conditions prevailing in this country [...] these considerations make it impossible to lay down any such general rule as your Society advocates. [...] The principles enunciated in this pamphlet will be found, it is believed, to be in general accord with those of your Society, so far as the latter are compatible with the local conditions prevailing in India (John Marshall to Thackeray Turner, Secretary of SPAB, 22 May 1907 (hand-written draft). ASI, Archaeology File no. 202, 1906).

In general, in the framing of rules governing preservation of monuments Marshall was very aware of what he described as "political, religious and traditional considerations and [...] a variety of local conditions which [...] render it impossible

to lay down any general rule which shall be applicable to all cases." (John Marshall to Lord Minto, 31 May 1907. SPAB, File on *India*). In his correspondence with the SPAB he consistently made a point of emphasizing the difficulty of reducing specific local factors to general rules. Having convinced the society of the need for restoration under specific circumstances in India, for example, Marshall was unwilling to commit this to writing in his conservation principles of 1906, saying:

> it seemed to me that the question was too complex [...] Indeed, I feel diffident about attempting to lay down any definite principles at all in such a delicate and difficult matter, since so much depends upon the circumstances in each individual case, and even when these are most favourable, the greatest circumspection is necessary before embarking on restoration (John Marshall to Thackery Turner, Secretary SPAB, 1 August 1907. SPAB, File on *India*).

Writing a code of conservation practice for ancient monuments in colonial India was fraught with the tensions of adhering to the broad, general principles of the protection of built heritage that by the early years of the twentieth century had assumed a transnational character in Europe. These were obviously introduced to India by the officials of the colonial state who laid down the rules of archaeological practice and the need to accommodate local practice and custom. This is, of course, an obvious thing to say about colonial systems everywhere; however, what is particularly interesting about the debate on monument protection between John Marshall and the SPAB in the early years of the twentieth century is the discursive employment of the local by the colonial state to engage with a metropolitan/European/global debate on the meaning and making of monuments. The notion of a living past was thus re-introduced into the debate on heritage and monuments by showing the importance of restoration for structures that were not mere relics from the past, but incorporated everyday practices of the present.

Finally, beyond the discursive significance of the arguments John Marshall was making, the debate also provides an insight into a fundamental conflict that was implicit in the colonial management of India's architectural heritage. Unlike the heritage movement in contemporary Britain and Europe, the care and management of historical sites, buildings, and monuments were in the hands of a bureaucracy that saw in its active role as manager of India's past its dispensation to rule. Standards of historical aesthetics were defined and framed by the very same bureaucracy. Armed with vast armies of staff and centralized printed codes of practice, the archaeological department, rather than being committed to cultural indicatives designed to spread awareness of heritage within indigenous communities, let alone being responsive to traditional approaches to architectural relics from the past in India, often found its authority on historic preservation challenged by the situation on the ground. Once aware of the vast sums of money that were potentially available for the preservation of ancient buildings, indigenous communities—often religious trusts and endowments—began to make full use of historicist and heritage arguments in order to avail themselves of government grants, and then sought to dictate the terms of architectural preservation by

obstructing the attempts of the colonial state to inspect, supervise, and control such work.[20] Thus, even a commitment to the local was ultimately a display of the inability of centralized colonial government to effectively control the practice of heritage management in colonial India. Ironically, it was precisely this kind of state control of heritage that preservationist lobbies in late Victorian and early Edwardian Britain, such as the SPAB and G. Baldwin Brown were clamouring for. In the many arguments they put forward to the government and campaigned publicly for, the efforts of the colonial government in India were held up as an example of responsible government that was not averse to discharging its duty to save the historical architecture of the colony.

Marshall's conservation guidelines thus reveal the tension implicit in combining, on one hand, a specific notion of preserving ancient buildings in their state of decay in order to preserve their 'historic' character, and on the other, an energetic, state-driven policy that only a colonial state could apply to ensure that this was done properly. In the final version of the *Conservation Manual*, which appeared in 1923, the attempt to reconcile these conflicting compulsions is clearly evident. As in the Ancient Monuments Preservation Act, which had been passed in 1904, the *Conservation Manual* made a distinction between "dead" and "living" monuments.[21] The former category of structures were to be historicized, i.e. their "authenticity" maintained ("it should never be forgotten that their historical value is gone when their authenticity is destroyed") and the "first duty" of archaeology was "not to renew them but to preserve them" (Marshall 1990, paragraph 25, 26). "Living" monuments (defined as monuments still in use for the purpose for which they were originally designed, mostly though not entirely religious structures) on the other hand could be restored "to a greater extent than would be desirable on purely archaeological grounds" (Marshall 1990, paragraph 25, 26), provided the reasons for opting for this course were specified. Read as a colonial text, the manual seems to stand for a strict ordering of monument-making practices in colonial India, regulating every aspect of the protection of ancient buildings. Seen in the context of a wider debate on the subject, a debate that spanned Britain, Europe, and Europe's colonies, the manual and its author stand for an attempt to bring the particular back into the bigger picture. But in both contexts, the manual represents the attempts of a centralized state to regulate the practice of monumental preservation; however, the reality on the ground often turned out to be a sobering experience.

[20] I have addressed this problem in my work (Sengupta 2009, 2013, also Dodson 2011).

[21] Editor's note: This colonial distinction between 'dead' and 'living' monuments is now renegotiated under the term 'living heritage' in modern conservation sciences (compare Warrack in this volume) as well as in anthropological research (compare Luco and Guillou in this volume). In specific circumstances, *both* criteria may apply to one and the same site (Angkor Wat, see Warrack), a whole ensemble (Angkor Park, see Luco), or a cultural landscape (sacred sites spotted over an 'ordinary' landscape, see Guillou).

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Picturesque Authenticity in Early Archaeological Photography in British India

Katharina Weiler

Abstract In the early years of photography and archaeology in colonial India, from the middle of the nineteenth century to the early twentieth century, the character of early archaeological photography was informed both by notions of empire as well as by artistic traditions that originated in Europe—namely, English picturesque landscape painting.

In this study attention is given to an overt transcultural process as exemplified in the entanglement of the picturesque aesthetic and the photographic images of ruins. This article addresses archaeological practice in colonial India and focuses particularly on notions of authenticity in both photographs and conservation philosophies. Like the picturesque pictorial tradition—in which one of the central subject matters was architectural remains depicted as having been reconquered by nature and time—colonial conservation principles for the preservation of Indian sites revealed an obsession with ruins. This suggested that, however much in decay, a building's original work was of infinitely more historical value than any later or new work. In the field of archaeology the qualities of photography, which were understood to communicate 'stern fidelity,' made the medium a much-appreciated tool for maintaining 'authentic' records of the ruination of Indian monuments. Both the photographer and the archaeologist sought to preserve a ruin in the physical condition that it was first received. In this way, notions of the picturesque aesthetic were translated to colonial archaeological practice with the approval of the Archaeological Survey of India.

Keywords Archaeology • Photography • Authenticity • Picturesque • Colonial India

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Archaeology and Early Photography in British India

In the nineteenth century, India, like other parts of South Asia, was characterized by the exploration by European surveyors and scholars who 'discovered' its people, cultures, landscapes, and monuments. The terms of discovery dictated the nature of any further engagement with the discovered, for example, through exposure to architectural heritage. In 1862 the *Archaeological Survey of India* (in the following ASI) was founded; its aim was primarily to survey and record Indian antiquities. As Bernard S. Cohn remarks "The word 'survey' in English evokes a wide range of activities," it means "to look over or examine something; to measure land for the purpose of establishing boundaries; to inspect; and to supervise or keep a watch over persons or place" (Cohn 1996, 7). Alexander Cunningham, a pioneer in the field of archaeological exploration, was appointed first surveyor of the ASI and in 1885 James Burgess succeeded him. At this point attempts to preserve Indian monuments finally "took shape in relationship to a governing sense of relevance and an ordering mode of organization" (Dirks 1996, xiii). Through the initiative of Lord Curzon (1859–1925), Viceroy of India from 1899 to 1905, the ASI finally became a legal entity for the protection of monuments with the promulgation of the *Ancient Monuments Preservation Act* in 1904 (redefined as the *Ancient Monuments and Archaeological Sites and Remains Act* in 1958), which was modelled on the British *Ancient Monuments Protection Act* of 1882. At the beginning of the twentieth century, when the ASI was being institutionalized by eminent contemporary British archaeologists like John Marshall (1876–1958), Director-General of the ASI from 1902 to 1928, the strategies of state-driven and centralized conservation of Indian cultural relics were defined.

In her contribution in this volume on Marshall's *Conservation Manual*, Indra Sengupta alludes to the European history of the preservation movement in late-nineteenth century Britain that played an important role for the interest of British artists, scholars, and statesmen in colonial India in India's ancient architectural remains. Yet, the rules for the practice of monument preservation in colonial India mirror the fraught need to bring metropolitan concepts into agreement with local priorities in the various regions in India. Recovered monuments and artefacts in India were recorded, documented, analysed, classified, archived, and displayed through the prism of the colonial power and within the framework of the colonial management of India's architectural heritage as implemented by the ASI.

Until the middle of the nineteenth century drawing was the most important act of recording; photography became a significant archaeological method and a key medium for recording Indian heritage only after the second half of the nineteenth century. Photographs were generally regarded as "truthful" copies and were therefore believed to depict architectural remains in an "authentic" manner. The qualities of photography, which were understood to communicate "stern fidelity" made the medium a much appreciated tool for maintaining "authentic and real" records of the ruination of Indian monuments. European photographers—amateurs, commercial artists, and employees of the British colonial government alike—pioneered the

development of media on the Indian subcontinent, rendering their photographs "cultural texts of British colonialism" (Pelizzari 2003, 23).[1]

The following study deals with photography as a new method of recording, documenting, collecting, archiving, and preserving architectural heritage from the middle of the nineteenth century to the early twentieth century, the period that marks the very beginnings of photography and archaeology in India. Attention will be paid to an overt transcultural process—namely, the entanglement of the picturesque, photographic images of ruins, and archaeological practice in India, as well as notions of authenticity in both photographs and conservation philosophies. It shall be demonstrated that, on the one hand, the awareness of the photographic image as a scientific, archaeological tool grew, and that this new technology served the colonial programme for archaeologizing Indian monuments. On the other hand, this study provides insight into the wider context around the production of photographs of ruins, particularly in consideration of eighteenth- and nineteenth-century drawings and paintings that often followed the picturesque aesthetic. It deals with the question of how the picturesque aesthetic contributed to determining the 'archaeological gaze' in the composition of a photograph and in the way that a ruin was documented, as well as the choices made to depict certain monuments and objects of archaeological study. This investigation of photographic ruin images focuses on the negotiation processes evident in these images, and challenges both the notion of a pleasing picture as well as archaeological interest and colonial cultural concepts.[2]

Photography Finds Its Way into Early Conservation Principles for Indian Monuments

The introduction of photography into India brought with it the creation of photographic archives, some of them testifying to the official campaigns conducted by the British in order to document and classify Indian architectural remains (Pelizzari 2003, 23). In the 1850s Britons like Thomas Biggs (1822–1905), from the Bombay Artillery, William Harry Pigou (1818–1858), from the Bombay Medical Service, and the photographer Linnaeus Tripe (1822–1902)—just to name a few—were

[1] Editor's note: In comparison to Weiler's focus on photographs as 'cultural texts', Marshall's *Manual* can be seen as a 'written cultural text of British colonialism', see the contribution by Sengupta in this volume.

[2] Editor's note: Over the course of the last decades, this colonial trend of 'archaeologizing' architectural sites through their translation into picturesque motives has been, to a certain extent, continued in the virtual renderings of architectural sites by incorporating historic photographs into their data accumulation. The differences in applying these virtual models to different audiences and purposes is discussed in this volume from the perspective of surface- and image-based models (see Gruen), building research (Toubekis/Jansen, Sanday), architectural history (Nguonphan, Cunin), and the globalized tourist industry (Chermayeff).

employed by the government as architecture photographers to document India's architectural heritage.

By the end of the 1860s photography was regarded as an inherent part of a detailed programme of documentation, measurement, conservation, and restoration (Forbes Watson 1869). Furthermore, in 1870 the government expressed an interest in employing natives and training them in the task of photographing, measuring, and surveying buildings. For example, Rajendralal Mitra (1822–1891), an antiquarian and Indologist and member of the Asiatic Society of Bengal, came to head the extensive documentation of the ancient temple architecture and sculpture of Orissa.

In the 1870s a few professional photographers were employed for the documentation of buildings, most of those responsible for the photographic documentation were amateurs and the archaeologists themselves such as the ASI member Joseph David Beglar, who was General Alexander Cunningham's assistant (Falconer 2001a, 234; 2001b). Decades later, "a small staff of draftsmen, photographers, and clerks" was mentioned in the *Indian Archaeological Policy* of 1915 issued by John Marshall, and it was further stated that it was the duty of the archaeological superintendents (advisors to the local governments in all matters pertaining to archaeology) "to compile or revise lists of ancient remains in their circles, to advise Government as to which are to be preserved and which protected under the Ancient Monuments Act, and to prepare such measured drawings and photographs as are needed for permanent record" (Marshall 1916, 5f).

In paragraph 22 of the *Conservation Manual* of 1923, John Marshall further highlighted the role of photography as a means of preserving and repairing "protected monuments":

> The conservation notes of Archaeological Officers should be accompanied by representative photographs showing the condition of the monument from all points of view before its repair is taken in hand, and they should include full particulars (illustrated as a rule by sketches or scale drawings) of all works such as windows, doors, railings, roofs, seats, or lamps, which are to be restored or newly inserted. No work is to be put in hand without such particulars.

Regarding historic publications on archaeological sites in India, scientific photographic documentation was often accompanied by texts in which the decayed architectural remains were associated with the pre-colonial past: India's erstwhile grandeur as opposed to its bright future under cultivated British rule. From today's perspective, early photographs of Indian architectural relics are kaleidoscopes of the different ways of negotiating both the concept of Indian architectural heritage and colonial archaeological ambitions. Many such photographs suggest the historical implications of the migration of ideas, meanings, values, identities, and politics. In her reflections on the value of early photographs of India as cultural artefacts through comparison with various types of images other than photography, Maria Antonella Pelizzari notes that "European illustrations of the Indian subcontinent followed prescribed routes, conventional grids, and pictorial schemata in which observation was constructed by a cultural map and a political program fostered by colonial institutions like the East India Company and by cultural patrons eager to bring images of India back to the (European) continent" (Pelizzari 2003, 25).

Archaeologizing the Picturesque in Eighteenth-Century Paintings

In the eighteenth century, orientalist scholars (historians, archaeologists, mythographers, and armchair travellers, for example) availed themselves of a variety of sources to advance their knowledge of Asia. This included Greek and Roman classical accounts of Asia, biblical narratives, and European (second-hand) travelogues. However, the late eighteenth and early nineteenth centuries witnessed profound shifts in the European historiography of large parts of Asia, facilitated primarily by the increasingly physical presence of British soldiers and administrators. The trajectories shifted from a primary, scholarly reliance on textual materials to the awareness that on-the-spot archaeological analysis together with textual sources could be used to provide a more balanced picture of India's monumental histories (Dodson 2010, 76 and 82). In fact, the attempt to record architectural remains through empirical observation in order to preserve them, at least on paper, was already articulated by the English architect and painter James Stuart (1713–1788) in the *Proposals for publishing an accurate description of the Antiquities of Athens* (1748). In 1751 Stuart, together with the architect and artist Nicholas Revett (1721–1804), travelled to Athens on an expedition organized and funded by the Society of Dilettanti of London. In Athens they studied the Greek ruins, particularly those of the Acropolis, and after returning from their Grand Tour (a journey often taken by the sons of the British nobility who travelled to study the cultural legacy of classical antiquity in situ) they published their findings in the influential *The Antiquities of Athens* (1762–1816, four volumes; the first volume appeared in 1762), which included picturesque views as well as architectural plans, elevations, measurements, and "exact delineations" (Stuart and Revett 1748).[3] Late eighteenth century architectural drawings of ruins in Europe thus fed into both the delineation of empirical observation and the Romantic visual production of ruins.

With respect to the documentation of India's architectural heritage, European artists, scholars, and travellers had experienced ancient monuments long before photography was finally introduced in India. One tool that helped to create scenic landscapes using central perspective was the camera obscura, which had been in use in Europe as well as in India before photography was invented. British artists working in India, William Hodges (1744–1797), for example, or Thomas Daniell (1749–1840) and his nephew William (1769–1837), employed this tool. The camera obscura was a dark box with a hole in one side that allowed light to enter and an inverted image was projected inside the box so that the outlines of the image could be traced to accurately include central perspective (Bautze 2008, 17). The Daniells were among the first English landscape painters to travel through India (between 1786 and 1794) drawing and painting Indian landscape and monuments. After their return to England they turned their watercolours into aquatints in order to publish

[3] Cited from *Proposals for publishing an accurate description of the Antiquities of Athens* (1748) as quoted in a footnote in Stuart and Revett 1762–1816, vol. I (1762), preface).

Fig. 1 Ruins of the Palace of Tirumala (1798), Thomas Daniell. Hand coloured aquatint. 42.5 × 60.3 cm, from: Thomas and William Daniell. 1795–1807. *Oriental Scenery*, vol. II. London, plate 43 (Yale Centre for British Art, Paul Mellon Collection)

Fig. 2 Hadrian's Villa in Tivoli: The Apse of the So-Called Hall of the Philosophers (ca. 1774). From Piranesi's *Vedute di Roma* (The Views of Rome). Drawn up by Giovanni Battista Piranesi, etched by his son Francisco. The picture is inscribed "Avanzi di una Sala appartenente al Castro Pretorio nella Villa Adriana in Tivoli. A Tribunale ornato di nicchie." Print. 44 × 57.7 cm (Staatliche Kunsthalle Karlsruhe, Kupferstichkabinett, Inv. IX 3588)

Fig. 3 Engineer Officers of the British Army with a draftsman and a guide surveying a Hoysala Temple in South India (ca. 1800–1810), unknown draftsman under the direction of Colonel Colin Mackenzie (The British Library)

their views of India, a work they titled *Oriental Scenery* (published in London in six sections between 1795 and 1808).

An aquatint from *Oriental Scenery* called *Ruins of the Palace of Tirumala* (1798) (Fig. 1) features the decaying palace of the Raja Tirumala Nayaka in Madurai dating back to the seventeenth century and is a good example of the ruin as a central motif in paintings of Indian landscapes. The drawing is reminiscent of familiar views of Greek or Roman sites and of Arcadian landscapes like those depicted by the seventeenth-century painter Claude Lorrain: cattle, staffage figures, the play with light, shadow, and perspective are the features most closely, if not inevitably, tied to the picturesque ruin overgrown with scrub. Most notably, Daniell's picture is reminiscent of Giovanni Battista Piranesi's view of *Hadrian's Villa in Tivoli* (1774) (Fig. 2) in its choice of motifs and the use of light and shadow. Another painting (Fig. 3) made sometime between 1800 and 1810 by an unknown draughtsman working for Colonel Colin Mackenzie (1754–1821), the first surveyor general of Madras, depicts an officer of the East India Company who is about to draw a ruined Hoysala temple. Like the drawing by Thomas Daniell, the picture takes up the central motif of a landscape with a ruin that is overgrown with bushes and trees and surrounded by grazing cattle. This was a recurrent motif that could be traced back to the very notions of "picturesque beauty" as suggested by William Gilpin and other landscape and garden theorists in the first half of the eighteenth century. In both drawings the presence of a British painter and his retinue is a "typical practice of recording and framing the Indian landscape within

the conventions of European painting" (Pelizzari 2003, 25). As I have discussed elsewhere (Weiler 2009, 68), the painter portraits, also evident in some of James Stuart's engravings, invest the pictures on the one hand with a degree of authenticity, claiming the Briton's physical presence in a land far away from England. On the other hand, numerous nineteenth-century orientalist scholars surveyed India's ancient architecture as "a form of text in stone, more stable and hence authentic than ephemeral written records, in which one could read essential truths about the values and creative propensities of the peoples who had produced it" (Scriver 2007, 28, also Cohn 1996, 76–105). The motif of an Englishman drawing a ruin thus intervenes against the process of decay and marks what Tapati Guha-Thakurta calls the "colonial act of the recovery of history and culture, the preservation of stone on paper" (Guha-Thakurta 2003, 117).

Principles of Picturesque Beauty

Any investigation of the entanglement between the picturesque aesthetic, paintings, photographic images, ruins, and the colonial archaeological gaze in India should consider that "principles of picturesque beauty" were initially formulated by British landscape theorists in the eighteenth century. In the first half of the eighteenth century the landscape garden developed as a new form of garden art modelled after prototypes from painting and poetry. The acquisition of pictographic viewing habits was enhanced by the ideal of nature that had been disseminated by European landscape painting and nature poetry. Resulting from this development, connoisseurs—artists and travellers—evaluated a landscape garden by its pictorial quality and were instructed to search for the well-known ideal in reality. In his travelogues, William Gilpin studied and valued certain qualities of British landscape gardens and nature that were comparable to those of a painted image.

Furthermore, Gilpin's travelogues were a significant catalyst in making travel in search of picturesque scenes in a natural environment a popular late eighteenth-century leisure activity. In Gilpin's view, when entering a supposedly unexplored country the "pleasing expectation" (Gilpin 1792, 48) evoked in the traveller was the basis for aesthetic pleasure of any kind. In search of picturesque landscapes, artists and tourists alike had to be equipped with a Claude glass or black mirror—a small mirror, slightly convex in shape, with a tinted surface. A painterly quality was evoked with the help of such mirrors, as they abstracted the reflected subject from its surroundings and reduced and simplified the colour of scenery. In this way the mirror was used as a tool to choose certain scenes and as a frame for drawing sketches of picturesque landscapes. The user would turn his back on the scene to observe the framed view through the tinted mirror. In doing so, the landscape was not only explored with a distant eye, but any unexplored scenery could also be subjected to an ordering scheme.

Through the choice of motifs Gilpin distinguished between beautiful and picturesque objects and examined which qualities of an object made it a suitable motif for an artist of the picturesque, "that kind of beauty which would look well in a picture" (Gilpin 1798, 238). He was aware that in observing an object's surface "roughness forms the most essential point of difference between the beautiful, and the

picturesque" and suggested turning a "smooth building" into a "rough ruin" (Gilpin 1792, 6–7). Early photographic images of Indian scenery and monuments were based on such notions of the picturesque. The "rough ruins" of India's past were located in a landscape that was explored by the colonizing British and attracted their eyes. In photographic images depicting Indian ancient monuments, photographers transformed well-known notions of the picturesque and seeing habits that were familiar from landscape painting into a new medium. In other words, such images generally communicated a special kind of photographic aesthetic that was informed by the picturesque tradition even though the focus was now determined by the lens of the camera.

Archaeology and the Search for Truth Through Photography

Shortly after the development of photography in Europe in the 1840s, the medium was introduced to colonial India where its status grew rapidly. In many reports of meetings and exhibitions held by the newly established photographic societies during the Indian presidencies of the 1850s, the qualities of photography's "combining potential for artistic expression with the practical merits of information gathering" (Falconer 2001a; 2001b, 13) was a constant refrain. On the occasion of an inaugural meeting held in October 1854 in Bombay, Captain Harry Barr of the eighth Bombay Native Infantry described India's "magnificent scenery, its temples, palaces, shrines and ruins dating back to the remotest antiquity" (Barr 1855, 2–3) as the subject matter best suited to the new medium. To him, photography was an "art, of which the beauty and utility are only surpassed by its truthfulness" (Barr 1855, 2). It was also in this respect that in 1857 Reverend Joseph Mullins recognized the advantages arising from the "stern fidelity of photography" (Mullens 1857, 33).

Samuel Bourne (1834–1912) ranks among the most famous of the early photographers and influential landscape, architectural, and portrait photographers active in India during the nineteenth century. In 1863 he went to India where, together with Charles Shepherd, he set up the photo studios Bourne & Shepherd in Simla (1863), Calcutta (1867), and Bombay (1870). Before Bourne undertook three major expeditions to the Himalayas and to the Ganges River, he articulated his notions on the qualities of photography before the Nottingham Photographic Society in 1860. In Bourne's eyes, a photograph was "simply the reflection of nature" and the photographer was "bound to simple truth—happily, that is an important, if not all the important, principle in representation" (Bourne 2001, 169f)[4] while "searching for the picturesque" (Bourne 2001, 166). According to Bourne, a photograph possessed "marvellous truth and power" (Bourne 2001, 176) and he listed the advantages that the new medium had brought to contemporary

[4] The book includes the four series of letters Bourne wrote to the *British Journal of Photography*. They were first published between 1863 and 1870. Also included are the full texts of two of his earlier lectures: *On Some of the Requisites Necessary for the Production of a Good Photograph*, given by Bourne before the Nottingham Photographic Society in 1860; and *The Original Fothergill Process*, first published in the *British Journal of Photography* in 1862.

antiquarians and linguists by providing them with "exact and faithful copies" (Bourne 2001, 181) of inscriptions and hieroglyphs.

Samuel Bourne never contributed to official campaigns for the photographic documentation of Indian architectural relics, nor did he publish his work in books. However, his photographs of Buddhist, Hindu, Jain, and Mughal structures together with the work of other contemporaries, like the committed amateur Alexander Greenlaw (1818–1870),[5] served James Fergusson (1808–1886) as an immediate model for his research.[6] In the preface to his book *History of Indian and Eastern Architecture* (first published in 1876) James Fergusson, who devoted himself to the study of India's architecture, mentions the vast photographic archive that had already been established in India. He recognizes that "for purposes of comparison such collections of photographs as are now available are simply invaluable." He highlights the qualities of the new medium for all scientific archaeological and architectural research stating that for "detecting similarities, or distinguishing differences between specimens situated at distances from one another, photographs are almost equal to actual personal inspection" (Fergusson 1910, vol. 1, vii). Fergusson, who is also the author of *Picturesque Illustrations of the Ancient Architecture of Hindustan*, published in London in 1847, initiated the exhibition of some of Bourne's photographs of Indian architecture at the Paris World Exhibition in 1867 and in London's South Kensington Museum, which later became the institutional centre for the study of Indian ancient monuments. For the illustration of his *History of Indian and Eastern Architecture,* Fergusson translated some of Bourne's photographs into wood engravings without referencing any of the photographers whose work he copied. As Pelizzari notes: "The shift from first-hand experience of the temple to its photographic rendering, and from the photograph to another kind of copy, was understood to have no interpretative impact, despite the manipulation of the image by cropping and framing and the translation from one medium into another" (Pelizzari 2003, 23). Fergusson's belief in the reliability of photographic images may have legitimized making woodcut copies that accurately reproduced the photographic model but also partly allowed for the artist's fantasy. A wood engraving version (Fig. 4a) of Bourne's photographic documentation of an *Ancient Buddhist Tower at Sarnath, Benares* (Fig. 4b) (ca. 1865/1866), is found in Fergusson's publication. Bourne's depiction contains a photographer's reference to General Cunningham's Archaeological Report

[5] Compare, for example, Alexander Greenlaw's photographs of the ruins of Vijayanagara in the Alkazi Collection of Photography, *Lotus Mahal from the South*, 1856 (ACP: 99.01.0003), or *Bhima's Gateway*, 1856 (ACP: 99.02.0028) (Greenlaw's pictures are published in Michell 2008) with the woodcuts nr. 243 of a *Garden Pavilion at Vijayanagar*, or nr. 168 *View of City Gateway, Vijayanagar* (Fergusson 1910, vol. I).

[6] According to the *Art Journal,* published in 1871 on the occasion of the International Exhibition in London, Fergusson's task to achieve a deeper understanding of Indian architecture through systematic enquiry had been hindered primarily by the difficulty of obtaining "really accurate representation of the great works of the architects and sculptors of India." However, "photography has been the means of overcoming this difficulty, with a success, too, unsurpassed probably in any other similar field of operation." (Wallis 1871, 65).

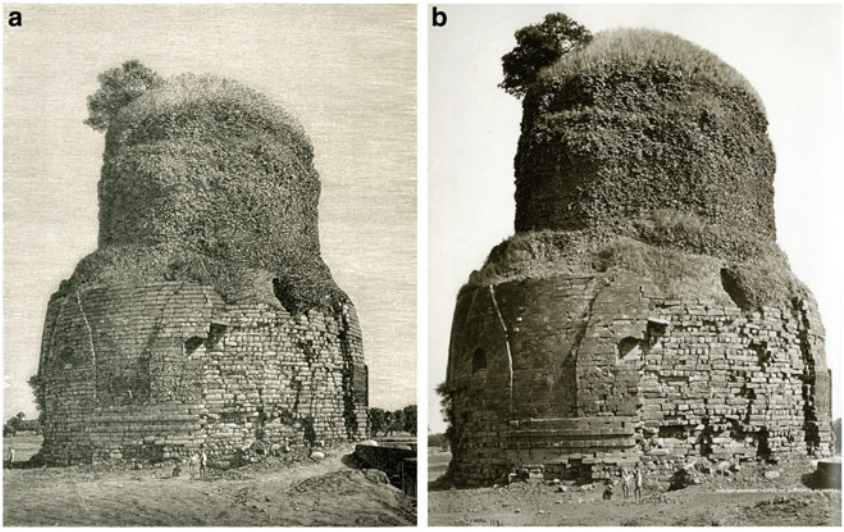

Fig. 4 (**a**) Tope at Sarnath, near Benares, wood engraving from a photograph by James Fergusson (Source: Fergusson 1910, vol. I, 72, plate 16) (**b**) Ancient Buddhist Tower at Sarnath, Benares (1865–1866), Samuel Bourne. 28.8 × 23.3 cm (Collection of Ruth and Peter Herzog, cat. nr. 1181)

(Cunningham 1864). Notes like this, made by Bourne about some of his photographs, testify that he was aware of General Alexander Cunningham's archaeological activities and that the discipline had had a reverse effect on photographers of historic sites.

Capturing Indian Architecture and Landscape Through the Prism of British Photographers' Lenses

Even though the new medium of photography very quickly became an important instrument in the documentation of Indian monuments, it was nevertheless informed by viewing habits familiar to British photographers and the subjective motivations that had an impact on their work. In many examples photographic depictions of "picturesque India" reveal orientalising (and 'archaeologizing,' as the title of this volume suggests) notions, while the choice of motifs is characterized by the photographer's prejudiced search for "all the minute varieties of oriental life; of oriental scenery, oriental nations and oriental manners" (Mullens 1857, 33), as Reverend Joseph Mullins once outlined in a lecture to the Bengal Photographic Society entitled *On the Applications of Photography in India*.

Picturesque "oriental sceneries" including Indian landscapes and architecture were often the subject of early photography and were presented through the 'European lens'. The unmistakeably 'European view' that is evident in the photographs taken by British photographers in their Indian colony derived from

the fact that their viewing habits initially facilitated the visual translation of the strange into more familiar motifs. Indian, Egyptian, Greek, and Roman antiquities are listed by Gaston Tissandier in his *A History and Handbook of Photography* (1876) and are described in the following manner:

> Again, what resources in the hands of an architect, or an archaeologist, are the views of buildings in distant countries! The marvels of Athens and Rome, the inimitable richness of the monuments of India, the bold architecture of Egyptian temples, can be kept in his portfolio, not modified and disfigured by an untrustworthy pencil but such as they are in reality with their beauties, their imperfections, and the marks of destruction which time has engraved upon them. Photographic prints are mirrors from which are reflected the banks of the Nile and of the Indus—the buildings and the landscapes of all countries through which the camera has passed. (Tissandier 1876, 301f)

In the field of archaeology, the qualities of photography – allegedly communicating "stern fidelity" – made the medium a trustworthy instrument for maintaining "authentic" records of India'a ruins. Thus, European artistic conventions expressed, for instance, in the choice of motifs, composition, and perspective, were established further in India and can be clearly seen when comparing some of the photographs taken in the second half of the nineteenth century of Vijayanagara, "the most extensive of all ruined sites in South India" (Verghese 2008, 23) (now archived in The Alkazi Collection of Photography) with engravings originally published in the late eighteenth-century work *The Antiquities of Athens* by Stuart and Revett and in a *Supplementary to The Antiquities of Athens* (1830). The *North East View of the Temple of Apollo Epicurius at Bassae near Phigalia* (Fig. 5) and Alexander Greenlaw's[7] picture developed from a paper negative of the Gateway and Ganesha Temple above Vijayanagara taken in 1856 (Fig. 6), reveal striking similarities: seen from the same angle, a heap of ruins towers in front of a decaying columned hall in both cases.

A View of the Eastern Portico of the Parthenon (Fig. 7) and Alexander Greenlaw's photograph of the Krishna Temple Tank in Vijayanagara (1856) (Fig. 8) demonstrates that in both cases the building lines created by the foreground buildings—the borders of the tank in the one picture, and the decaying wall in the other picture—meet in a vanishing point to the left of the central motif, the columned ruin. The distinct translation of motifs found in India into artistic conventions that originated from visual productions in Europe is evident in the photograph *King's Balance with Anjanadri Hill in the Distance* (Fig. 10), which was taken in the 1880s by a photographer working for Nicholas & Co., a commercially successful firm in South India. The viewer's angle as well as the gateway motif and the staffage human figures are reminiscent of the view of the *Aquaeduct of Hadrian* (Fig. 9). However, in contrast with the latter, the Indian ruin photographed from a close distance is monumentalized.

Further similarities are found in a panorama photograph of the Indian site taken in the 1880s by Nicholas & Co. from the top of the Mahanavami Platform (Fig. 12)

[7] Sophie Gordon observes that when photographing landscapes and topographical views Greenlaw often kept away from the purely picturesque, highlighting unusual compositions instead (Gordon 2008, 159).

Fig. 5 North East View of the Temple of Apollo Epicurius at Bassae near Phigalia, by Thomas Leverton Donaldson, from *The Antiquities of Athens* (1830, 4th vol., plate I). A heap of ruins towers in front of the decaying columned hall of the temple. In the distance one sees Mount Ithome and the Gulf of Messenia (University Library Heidelberg)

Fig. 6 Gateway and Ganesha Temple above Hampi (1856), photograph by Alexander Greenlaw. The photograph is reminiscent of the North East View of the Temple of Apollo Epicurius at Bassae near Phigalia. Modern positive (2007) from waxed paper negative. 30.5 × 38.0 cm (The Alkazi Collection of Photography: 99.01.0033)

Fig. 7 A View of the Eastern Portico of the Parthenon, from *The Antiquities of Athens* (1825, 2nd vol., plate VI). James Stuart stages the Parthenon of the Greek Acropolis with special light effects. The ruin of the Parthenon is illuminated by the sunlight and rises majestically behind decaying rubble masonry lying in shadow. A mosque is depicted behind the Parthenon, the latter symbolizing the supremacy of the Greek world (University Library Heidelberg)

Fig. 8 Krishna Temple Tank in Vijayanagara (1856), photograph by Alexander Greenlaw. Human staffage figures are placed at regular distance from each other; they underscore depth in the image and serve as a scale reference. Photographer re. 23–56; modern positive (2007) from waxed paper negative. 29.2 × 27.0 cm (The Alkazi Collection of Photography: 99.02.0032)

and in *View of the Ruins of the Temple of Jupiter Olympius, at Agrigentum* (Fig. 11). In both images the building remains extend diagonally from the right lower part of the picture into the vastness of the landscape. As described above, British

Fig. 9 Detail of Aquaeduct of Hadrian, from *The Antiquities of Athens* (1827, 3rd vol., plate XXVI) (University Library Heidelberg)

Fig. 10 King's Balance with Anjanadri Hill in the Distance (1880s). Photo by Nicholas & Co. Albumen Print. 22.8 × 29.1 cm (The Alkazi Collection of Photography: 2001.08.0001 (31))

photographers were often "familiarising and domesticating" (Ryan 1997, 51) otherwise alien motifs and, as they had done before through eighteenth- and early nineteenth-century painted views of Indian architecture, they were also globalizing their notions of "visual realities." The photographs of Indian landscapes and architectures and their compositions reflect an orientation towards the prevalent painting style in Europe. The photographer would have been well acquainted with this style in terms of choice of motifs as well as the knowledge of the principles of composition, symmetry, light and shadow, and the technical modes of production. In the second half of the nineteenth century these representations of India enjoyed an ever-growing audience in both India and Europe. Propounding canons of taste

Fig. 11 View of the Ruins of the Temple of Jupiter Olympius, at Agrigentum, C. R. Cockerell from *The Antiquities of Athens* (1830, 4th vol., plate VII). The remains of a building extend diagonally from the lower right-hand part of the picture into the landscape. A shepherd is placed in the central axis while his herd is distributed over the Arcadian landscape. Perspective is created through the ruins and the clouds that are caught in the vanishing point (University Library Heidelberg)

Fig. 12 Part One of three-part panorama from top of the Mahanavami Platform (1880s), Panorama looking to the north by Nicholas & Co. Portions of the enclosure walls emerge from the rubble and undergrowth. The Hazara Rama temple is seen in the right background. Albumen Print. 23.1 × 28.7 cm (The Alkazi Collection of Photography: 2001.08.0001 (24))

and adding to the formation of "priorities in the creation of a monumental record of a civilization," colonial photographic depictions of archaeological scenery were tools for what Bernard S. Cohn calls "the most significant instrumentalities of rulership" (Cohn 1996, 10).[8] Finally, these mechanisms of perception were handed down to and absorbed by Indian photographers trained by the British like Lala Deen Dayal (1844–1910),[9] a pioneer in nineteenth-century colonial photography.

A picturesque ideal prevails in many early photographs of monuments, architectures, ruins, and cultural relics, and many photographic depictions tell of an evident struggle to organize the scenes and to put Indian monuments and landscape—both part of "oriental scenery"—in "the right order." The demand for colonial photographers to literally "mirror archaeological truth" was intertwined with the obvious tensions between the domestication of India into European artistic traditions and its orientalization. It is, for instance, striking that compared to picturesque paintings and engravings, bucolic motifs are often neglected in photographs of the architectural traces of the past. In general, staffage is demonstrated only through isolated human figures or trees and bushes that surround the ruins and serve as a scale guide.[10] Apart from that no orientalizing scenes, no cows or goats, not even clouds, distract from the major, archaeological motif. This fact hints at some pictorial peculiarities that evolved from the colonial aesthetic that can be seen in archaeological photography towards the end of the nineteenth century.

The Picturesque Authenticity of Ruins

The visions of picturesque aesthetic presented above were fused with a belief and awareness that photography was a suitable medium to record what Captain Harry Barr called in 1854 India's "magnificent scenery, its temples, palaces, shrines and ruins." The photographs allegedly reflected nature—the "simple truth"—and the photographer was to create "exact and faithful copies" that qualified for use in the archaeological scientific discipline. Both the photographer and the archaeologist sought to preserve a ruin in an authentic manner; that is, to conserve it in the

[8] Editor's note: Whereas photographic depictions codified the colonial gaze on the 'archaeologized' architectural object, prescriptive manuals for archaeologists and conservators codified the 'archaeologizing practice' on cultural sites (compare Sengupta in this volume).

[9] Lala Deen Dayal was a leading Indian professional who was patronized by both Indian princes and the British Raj. He was the official court photographer to the sixth Nizam of Hyderabad, Mahbub Ali Khan, Asif Jah VI.

[10] Editor's note: Staffage of the 'colonized local' was and still is an effective strategy to decontextualize the local as a real stakeholder of the depicted property and site. In most cases, the staffage 'local' figures do not really engage with the sites as their owners but merely serve as picturesque decoration of a supposedly archaeological and dead site without owners. This is true for the staffage figures in reconstitutive drawings (compare the constribution by Baptiste) and the description in tourist guide books through archaeological parcours (compare Falser). However, staffage figures play a minor role in virtual representations of archaeological sites, as is discussed in various contributions in this volume, and as it is depicted on the front cover of this book.

physical condition it was found in—the former did this by preserving its state of repair in a photograph, the latter by recording it (in turn, inter alia, with the help of photographs), putting it under protection, and conserving it. From the archaeologist's point of view, the architectural remains found at distant open-air sites in India, often outside the cities, were neglected buildings reclaimed by nature and time in a landscape that invited exploring, organizing, and controlling.

Some officials in the colonial state who determined the rules of archaeological practice in the last half of the nineteenth century were well aware of the advantages of dealing with India's ruined monuments; namely, that they were free of human presence, allowing them to remain aloof from the 'natives' and their respective customs, and which served the purpose of maintaining certain structures that were still in use. Ultimately, they called for the framework of the colonial state to establish custodianship of India's past. However, at the beginning of the twentieth century John Marshall's engagement with the role of the colonial state in preserving India's architectural heritage resulted in a differentiated evaluation of the rather general principles of the protection of monuments and on the European discourses on preservation that (as Indra Sengupta reveals in her contribution to this volume) had by then taken on a universalist, transnational character. Marshall advocated taking into account political, religious, and traditional considerations as well as local conditions, thus emphasizing the difficulty of applying general rules. On the one hand, in the *Indian Archaeological Policy* of 1915, John Marshall celebrated the ruin, stating that conservation and investigation are the two main functions of the archaeological department and that the government was "fully alive to the deplorable harm that may be done in the name of restoration, and except in special circumstances, are opposed to its being undertaken" (Marshall 1916, paragraph 19, 18). On the other hand, he added that "in the case of monuments which are still serving the purpose for which they were built, whether they be Hindu temples or Muhammadan mosques or tombs or palaces where ceremonial functions are still performed, there are frequently valid reasons for resorting to more extensive measures of repair than would be desirable, if the buildings in question were maintained merely as antiquarian relics." The general objective, however, was not "to reproduce what has been defaced or destroyed, but to save what is left from further injury or decay, and to preserve it as a national heir-loom for posterity." In their conservation practice the ASI distinguished between "dead" and "living" monuments and set guidelines for the conservation and restoration of architectural heritage that propagated an essentially Western concept of authenticity, which was guided by a structure's historical value, but at the same time suggested the significance of repair or restoration for structures that still incorporated everyday practice. Nevertheless, in paragraph 25 of John Marshall's 1923 *Conservation Manual* (based on the older pamphlets), which has informed ASI practice until very recently, Marshall provides a definition of "authenticity" as assigned to a monument under protection:

> Although there are many ancient buildings whose state of disrepair suggests at first sight a renewal, it should never be forgotten that their *historical value is gone when their authenticity is destroyed*, and that our first duty is not to renew them but to preserve them. When,

> therefore, repairs are carried out, no effort should be spared to save as many parts of the original as possible, since it is to the authenticity of the old parts that practically all the interest attaching to the new will owe itself. Broken or half decayed original work is of infinitely more value than the smartest and most perfect new work. (Marshall 1923, paragraph 25)

These lines clearly reveal an obsession with ruins since it is ruins, or structures devoid of any contemporary use, that are seen as documents of historical value and that are qualified as protected monuments entitled to protection by the state. In this respect conservation practice under the British colonial power was commonly at odds with Indian practices and traditions of maintenance, thus creating a schism between official and local practices which has plagued conservation practice in India ever since. In any case, it is clear that notions of the romantic and even picturesque tradition that prevailed in Europe continued to resonate through this focus on the ruin. A certain longing for the romantically picturesque mingled, of course, with a claim of preserving historical authenticity, and colonial ambition was thus transmitted and implemented in the Indian context by configuring European conservation philosophies for Indian monuments.

Conclusion

The identity of early photography in India was informed by political, social, and economic factors, as well as by artistic traditions that originated in Europe such as English picturesque landscape painting. The concept of picturesque was thus passed on for use in the new medium of photography. Photographers like Samuel Bourne, whose work was used by archaeologists active in India, were well aware of the aesthetic pleasure, which according to William Gilpin, could be enjoyed by the traveller through a combination of "pleasing expectation" and a kind of picturesque practice. Bourne described the feelings a photographer should have when about to go to a place in order to create photographs of "scenes of beauty and grandeur" (Rayner 2001, 175): "His heart thrills with intense pleasure when he remembers the delightful nature of his mission, and the sublime scenes he is about to visit." In Bourne's eyes, such feelings evoked by nature and the intuitive encounter with the picturesque and sublime are the optimal conditions under which one became a "genuine photographer." The results should be "constituting pictures which will ever possess the magic power of recalling and producing again the same unmingled pleasures he then enjoys."

In the field of archaeology the qualities of photography were seen to communicate a "stern fidelity" that made the medium a much-appreciated tool for maintaining supposedly authentic records of Indian monuments. While photography became an integral feature of the scientific discipline, colonial photographs of ancient architectural remains found in extant archives, collections, albums, and illustrated archaeological books may have depicted picturesque scenes. Motifs and compositional elements through which the photographers of ruined Indian monuments acquainted themselves with the unfamiliar ancient sites that were deemed to be of historic interest to the colonizing archaeologists and travellers,

are evident; often these photographs clearly mirror the intellectual concerns and aesthetic sensibilities of the photographers and their viewing audience.

Both archaeology and photography were "held capable of providing unmediated accounts, of capturing data supposedly out there, and for cultivating notions that their techniques are truth-making" (Guha 2010, 171). In the end, one might even say that colonial archaeologists who expressed their attempt to conserve Indian architectural heritage figuratively, saw the decayed sites through a kind of lens: the Claude glass, camera obscura, or camera was replaced by conservation principles that translated the tradition of the picturesque to archaeological practice and were even approved by the ASI.

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Part II
Archaeologizing Heritage II: Creating Visual and Spatial Experiences of Angkor

Virtual Visions of Angkor: Plaster Casts and Drawings in the Indochinese Museum of the Trocadero Palace in Paris

Pierre Baptiste

Abstract Linked with the development of the French colonial empire in Indochina, the scope of the mission organized in 1866 in order to check the navigability of the Mekong River allowed Louis Delaporte to be in direct contact with the impressive remains of the Khmer temples of Angkor. His subsequent missions in Cambodia were devoted to the increase of his knowledge of ancient Khmer architecture and were intended to set up a collection of art objects, plaster casts, photographs, and drawings that would be exhibited in the *Musée Indochinois du Trocadéro*, a museum he curated until his death in 1925. The aim of this paper is to explain his contribution to the world of art history and museums and to show how these documents were exhibited together in a didactic way.

Keywords Plaster casts • Louis Delaporte • Indochinese Museum • Musée Indochinois • Angkor

Exploring the Mekong: Delaporte and the Drawings of Angkor

It is well known that the beginning of French studies in Khmer history, art, and civilisation, is deeply linked with the development of the French colonial empire in Indochina. Knowing how far ahead England was in its process of colonization in India, Burma, and Southern China, Napoleon III (r.1852–1870) sought to develop the presence of France in this part of the world and he sent a mission there in 1866 under the guidance of Ernest Doudart de Lagrée (Fig. 1). The scope of this mission was to check the navigability of the Mekong River in order to use it as a commercial route between Southern Annam (later known as Cochinchina) and South China. Without entering into the details concerning the historical and diplomatic

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Fig. 1 The members of the 1866 Mekong expedition seated on the front terrace of Angkor Wat, Cambodia. From *left* to *right*: Francis Garnier, Louis Delaporte, Eugène Joubert, Clovis Thorel, Louis de Carné, Ernest Doudart de Lagrée. Photo by Emile Gsell (Musée Guimet archives)

background of this story, it seems relevant to underline here that Louis Delaporte (1842–1925), at the time *lieutenant de vaisseau* in the French navy, was one of the members of the scientific team of the expedition. This marine officer, whose talent in sketching landscapes and drawing monuments was apparently well known in the small world of the French military at that time, was given the responsibility of illustrating various aspects of the trip. Considering the voluminous publication that would serve as an official report of the mission after the explorers' return to France, Delaporte's task was a major commitment. Published as *Voyage d'Exploration du Mé kong* (Garnier 1873), this impressive document was commissioned by Napoleon III in the spirit inherited from the famed *Description de l'Egypte* issued soon after the Egypt campaign that was conducted by his ancestor Napoleon I. Published several years after the fall of the *Second Empire*, the impressive volumes of the *Voyage d'Exploration du Mékong* included many of Delaporte's drawings (Fig. 2). Despite the official scope of the mission—investigating the navigability of the Mekong River and the possible crossing of the South Chinese border through it—the study of the ruined monuments of the unexpectedly rich and ancient civilisation in Angkor—though far from the Mekong River—occupied much of the scientists' time.

Drawings of buildings lost in impenetrable jungle, romantic views of dismantled ruins, or idealistic reconstructions of monuments, all executed in a kind of classical approach, were to have a strong impact on contemporary people's minds and probably contributed to an increased interest and pursuit of vocations in the study

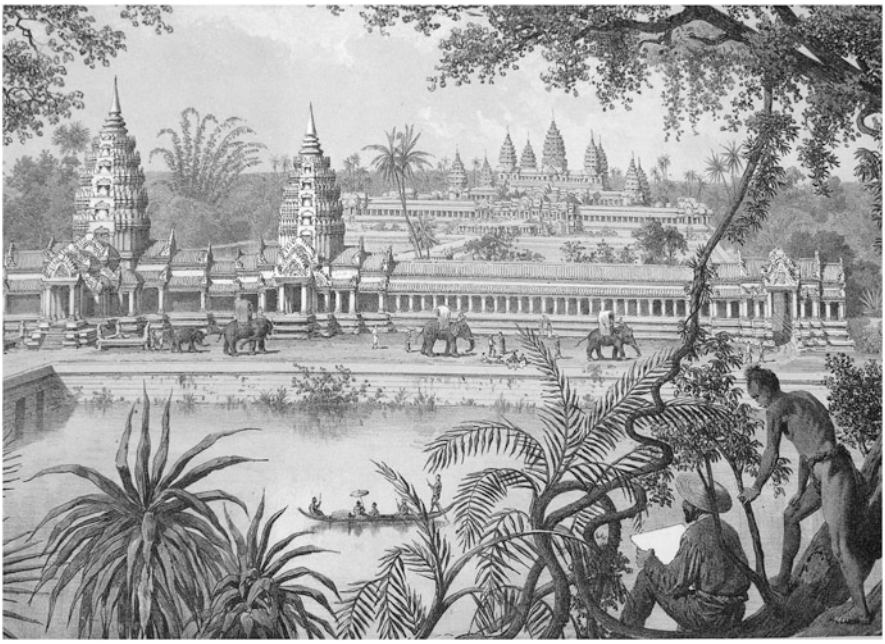

Fig. 2 General view of Angkor Wat from the west (detail). Chromolithography by Louis Delaporte and Eugène Cicéri (Source: Garnier 1873, plate III)

of this apparently forgotten civilisation. Even more important was the impact that these impressive architectural remains had on Delaporte's mind who, ever since he first discovered them, had but one wish and interest in his life: to put the beauty of Khmer art on display in Paris in exactly the same way that the glorious antique civilisations of the Mediterranean were then exhibited and explained to the European public. This ambition had nothing to do with the hubris of a monument looter, as Delaporte was most erroneously judged by some poorly informed journalists soon after. It was merely the ambitious project of an open-minded man who wanted to show the world that Cambodia housed the remains of an original culture that was on a par with the most brilliant and famous civilisations worldwide. At a time when triumphant colonialism emphasized a paternalist and rather condescending vision of the 'locals', such an attitude was revolutionary indeed.

A Museum of Angkor in France

It was for this reason that in 1873–1874, under the auspices of the Ministry of Public Instruction and Fine Arts, Louis Delaporte organized another mission to Cambodia (Delaporte 1874, 1877). This time the mission was entirely devoted to

Fig. 3 The boarding of the sculptures on rafts in Preah Khan, 1873. Drawing by F. Moller, engraving by Miranda, after Louis Delaporte 1880 (Source: Delaporte 1880, 13)

archaeology, at least in Delaporte's mind, because it had a slightly distinct official purpose. This allowed him to bring back to France, with a doubtful agreement with the Siamese authorities on site (Angkor was until 1907 not part of the French protectorate over Cambodia!), examples of ancient sculptures scattered in the jungle: images of Buddhist and Hindu gods that were once worshipped in the temples, statues of guardians deities and fearful animals that used to defend these monuments, and fragments of architectural pieces were saved from monuments almost completely in ruins but were, one should note, never detached from well-preserved buildings (Fig. 3) (compare also Delaporte 1880).

Delaporte's aim was to offer theses sculptures to the Musée du Louvre, the only institution in his mind suitable to host such masterpieces and able to place them on the very level of Egyptian, Greek, and Roman arts. Arriving back in Paris with the crates containing some of the world famous masterpieces (now preserved in Musée Guimet) Delaporte was greatly disappointed to discover that French museums, scholars, and curators were far from willing to accept these sculptures among their treasuries. At this time nothing was known about the iconography and antiquity of these sculptures, and nobody seemed to have been bold enough to accept them into the somewhat restrictive world of art that was familiar to educated European people. It is amazing to think that Delaporte's crates languished on the banks of River Seine, so close to Musée du Louvre, before they found a place that could decently host them. This place was found at last in Compiègne, where a vast,

Fig. 4 Castle of Compiègne: the Khmer museum in the Hall of Columns 1874–1878. Anonymous photography (Musée Guimet archives)

empty castle seemed finally able to house them. Four years earlier this place had been one of the favourite residences of the imperial court of Napoleon III. However, the defeat of 1870 and the troubles caused by the Commune de Paris combined with the revolution that drove the French imperial monarchy to an end, left castles like Saint-Cloud, Compiègne, and Fontainebleau, at worst burnt to the ground, and at best completely abandoned and left to lie empty and useless.

Louis Delaporte obtained authorization to use the entrance hall of the castle, better known as *la salle des colonnes* (the hall of columns), to set up his first Khmer museum (Croizier 1875, compare Falser 2013c) (Fig. 4).

This first display left Delaporte unsatisfied. He believed the decision taken by the fine arts department to be a mistake or some kind of misunderstanding. In his mind Paris was the only city where these masterpieces could be properly exhibited. The 1878 *Exposition Universelle* (World Fair) in Paris gave him an opportunity to transfer his collection back to the capital, where he tried to organize a Khmer exhibition in the new galleries of the *Palais du Trocadéro*, a space that was, in those days, dedicated to ancient art and archaeology. It is interesting to note at this point that some of the reports found in the world fair archives concern the discussions provoked by the grouping of displays of non-European art into sections belonging to ethnology and not to fine arts. The unspoken idea was, of course, to separate European civilisations from the rest of the world in an obvious attempt to emphasize European cultural supremacy. For Delaporte, this was better than nothing and the Trocadéro offered him space enough to show not only his collections of sculptures, but also the numerous plaster casts that he had made from Khmer monuments during his own missions and those of his collaborators.

Originals and Plaster Casts of Angkor: World Exhibitions and the Musée Indochinois du Trocadéro

Plaster casts had long been in use for the reproduction of classical fragments of Greek and Roman sculptures. Most of the European royal collections, which later became museums, preserved—along with original examples of sculptures—copies and plaster casts of important masterpieces that were part of renowned monuments or belonged to other collections, such as the celebrated *Apollo Belvedere* in the Vatican collection. Louis Delaporte was no exception; moreover, his casting techniques developed further with the growth of World Fairs organized in Paris in 1855, 1867, 1878, 1889, and 1900. This evolution allowed him to give viewers a more precise idea of the beauty and actual size of some of the most impressive Khmer monuments in the comfort of a Parisian display hall at a time when travelling to Asia was still extremely difficult and hazardous, especially in places like Angkor where the monuments were so obscured by vegetation that even the largest were hardly visible.[1]

During the 1878 World Fair the sculpture that aroused the greatest enthusiasm amongst the visitors to the Trocadéro galleries was the massive balustrade from the temple of Preah Khan in Angkor. This piece was the most impressive and unusual fragment of Khmer architecture and sculpture, at least to European eyes (Baptiste/Zéphir 2008, Falser 2013a) (Fig. 5).

But the 1878 World Fair was, of course, a temporary event and it is important to note here that Delaporte fought hard against the closing of his galleries. Indeed, he wanted his collections to be organized as a permanent museum. Thanks to his tenacity during the period from 1879 to 1880, he finally received the authorization from the fine arts department to definitively display his collection inside the Trocadéro galleries. At the same time, in the remaining part of the building, Eugène Viollet-Le-Duc (1814–1879)—the famous French architect who devoted his life to the protection, knowledge, and understanding of medieval architecture—organized a museum called the *Musée de Sculpture Comparée* (now the *Musée des Monuments Français* or Museum of French Monuments) which contained an impressive collection of plaster casts taken from some of the main historical monuments in the country. This deeply influenced Louis Delaporte who used the same techniques but different casters to develop his own exhibition of Khmer fragments (Guérinet n.d., Houe 1992; Zéphir 1996; Combe 2000; Baptiste 2002; Legueul 2005; Philippe 2011; Falser 2013b).

[1] Editor's note: As a surface-copying technique, plaster casts followed an approach quite comparable to colonial photographs of archaeological sites (see the contribution of Weiler in this volume). Both techniques served as a translation for original parts and their re-montage or display in occidental museums. Casts from Angkor were transported to France and reassembled into ideal hybrids, quite comparable to today's virtual reconstitutions of ideal or re-imagined Angkorian temple constructions on the basis of the analysis of decorative or structural elements (see Nguonphan and Cunin in this volume. Regarding other surface-scan techniques compare Gruen, Toubekis/Jansen).

Fig. 5 Cambodian antiquities at the World Fair of 1878. Drawing by F. Moller, engraving by Woodward, after Louis Delaporte 1880 (Source: Delaporte 1880, 245)

Several examples exhibited in the museum give an idea of the techniques used by Louis Delaporte to re-create fragments of monuments following his own classical vision of archaeology at a time when little was known about Khmer civilisation.

The balustrade brought from the eastern entrance of the Preah Khan temple in Angkor is a particularly relevant example (Fig. 6). When Delaporte travelled to Cambodia, this section of the temple was completely dismantled by the forest. The balustrade looked very different from what can be seen today: more than twenty gods (*devas*) and demons (*asuras*) in two separate rows bearing the long body of a *naga* snake. Later, during the first half of the twentieth century, Preah Khan, like many other monuments in Angkor, was cleared and restored. In the 1880s Louis Delaporte believed that the so-called *naga* balustrades looked different; his main mistake was to conceive of the *devas* and *asuras* (supposedly churning the Milk Ocean) as alternating in a single row on both sides of the causeway, when in fact the same figures are arranged on the same side—all the *devas* on the left-hand side and all the *asuras* on the right. This is certainly the reason why Delaporte brought an *asura* and a *deva* head to Paris to be arranged one behind the other: the *asura* first, followed by the *deva*. Later, in the *Musée Indochinois du Trocadéro*, he changed

Fig. 6 The *nâga*-balustrade from the Preah Khan temple of Angkor in the Musée Indochinois of the Trocadéro, 1880–1927. Anonymous photography (Musée Guimet archives)

the position of the two characters alternating first the *deva*, then the *asura*. Both arrangements were erroneous, as we now know (Fig. 7).

Perhaps more interesting than the particulars of the Preah Khan balustrade presentation is the way in which Delaporte was able to magnify the fragments he brought from the temple. He made a cast of the second body in order to create a third character. On top of that replica, he placed the *asura* head, which is now separated from the rest of the piece in the present display. What is more, in the 1880s the whole balustrade had the appearance of a sculpture made from a single stone block because all the visible joints were hidden by plaster and painted over in order to give an ideal vision of the sculpture.

The plaster casts were usually displayed alone as images of fragments still preserved in Cambodia. In the Indochinese museum collection more than 600 inventory numbers of plaster casts were displayed, ranging from very small fragments such as pilaster decorations, door frame elements, and parts of friezes, to ambitious reconstitutions of entire sections of Khmer buildings made up of casts originating from different monuments and grouped in a more or less scientific way. Delaporte's aim was to exhibit something more than mere isolated fragments to the public. Working with Louis Raffegeaud and Urbain Basset, who were casters, he strove at 're-creating' Khmer architecture in Paris by using casts taken from well-preserved monuments in Cambodia (Delaporte 1914–1924). Because of its obvious quality and good condition when Delaporte saw it, Angkor Wat was selected as his main source of inspiration. Several missions were sent to Cambodia to cast parts of the monument and to bring back abundant documentation consisting of annotated drawings with precise measurements of the selected parts of the building to be reproduced. The result was indeed amazing. The reproduction of the entrance gallery leading to the central tower of Angkor Wat at the top of the pyramid, for instance, was made following the exact scale of the temple (Fig. 8). Casts taken from different parts of the building, and reproduced several times on the Parisian

Fig. 7 The *nâga*-balustrade from the Preah Khan temple of Angkor in the Musée Guimet today (Photo by Thierry Olivier, Musée Guimet)

structure, were used in what can be properly called an architectural 're-creation' (Falser 2011). Some genuine details, put together on the French restitutions, nevertheless gave too perfect a vision of Khmer architectural art, since we now know that, even in Angkor Wat itself, neither strict verticality nor perfectly symmetrical proportions were really followed by the architects and sculptors. In the 1880s, such an assessment was far from obvious; yet, these reconstructions would surely have given the impression of a "Khmer genius who conceived such a sophisticated symbolical architecture", in Delaporte's own words (La Nave 1903, 1904).

Another example of these impressive architectural evocations could be admired in the reconstitution of the main gate of the western entrances in Angkor Wat, where one of the most beautiful lintels ever sculpted in Cambodia can still be seen (Fig. 9a, b). Once more in this case, genuine casts taken *in situ* were copied and repeated so as to give a complete and perfect vision of the monument (certainly too perfect and too complete a vision in many respects!). At the same time, in the

Fig. 8 Reconstitution of the central gallery of Angkor Wat. Plaster cast exhibited in the Gallery of the *Musée Indochinois* of the Trocadéro. Photo by Giraudon, c.1912 (Musée Guimet archives)

Musée de Sculpture Comparée the curators and casters were embracing a more restrained attitude towards genuine monuments; however, the technical conditions in which casters worked in France, as well as the knowledge of French monuments of the medieval or Renaissance periods, were also very different.

The reconstruction of one of the Bayon temple towers shows a further development in Delaporte's desire to evoke Khmer ancient architecture in Paris (Fig. 10).

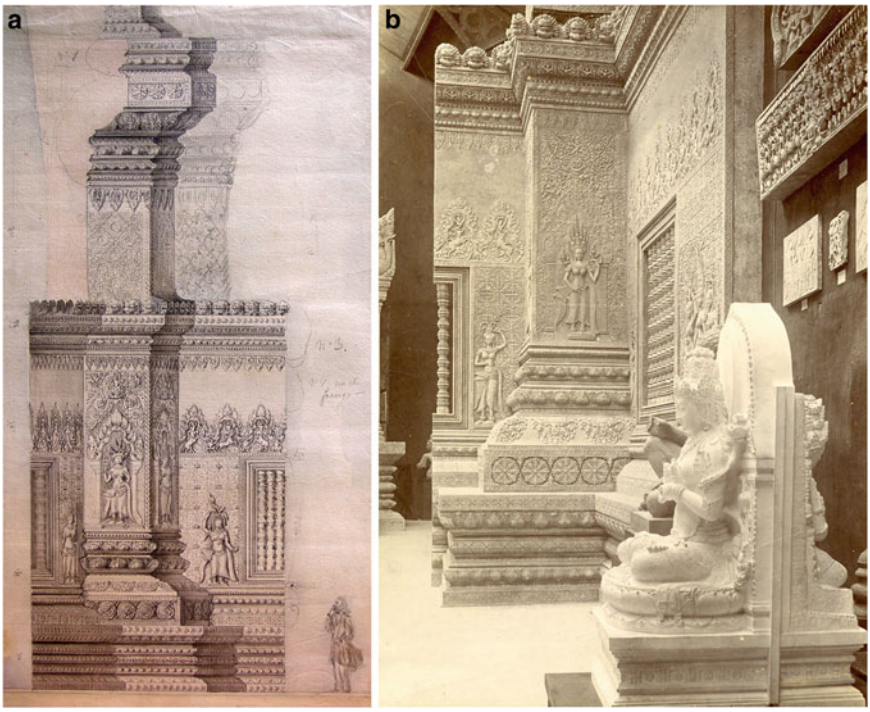

Fig. 9 (**a, b**) Reconstitution of the central part of the western entrance of Angkor Wat in the galleries of the *Musée Indochinois* in the Trocadéro Palace; *left*: a drawing on graph paper by Louis Delaporte, c.1880; *right*: the realized section with plaster casts of Javanese sculptures in front, photo by Giraudon, c.1912 (Musée Guimet archives)

Apparently complete, the building, which was made in Paris, gives a good sense of the famous face towers that so deeply impressed Pierre Loti and that he described in Romantic terms. It was a veritable jewel in the crown of the museum. Yet here again we find more than the mere reproduction of an actual structure since this tower never existed on the temple itself, nor anywhere else on any Khmer monument. Once more, Delaporte made use of genuine elements of architectural decoration, moulded here and there in the Bayon, but this time he assembled them according to pure fantasy. The recomposed building was conceived of as a sort of compendium of Khmer Bayon-style motifs rather than as a real restitution of a specific part of the temple. Placed on the four sides of the superstructure, the gigantic face itself was an over-moulding of the original cast taken on one of the towers of the Bayon. It is interesting to observe the similarities and differences of these over-mouldings, and to compare them to the original face in the temple itself (Fig. 11). Thanks to the comprehensive research, it has been possible to trace the exact location of where the cast was made in the 1870s, and it is no surprise to note that a particularly convenient place was chosen by the French casters (Philippe

Fig. 10 Reconstitution of a face tower of the Bayon temple in the *Musée Indochinois* of the Trocadéro. Photo by Giraudon, c.1912 (Musée Guimet archives)

2011): they selected the easily accessible south face of tower fifty. This tower ranks among the few located on the second level of the pyramid, half hidden by the third terrace of the monument. As the third terrace provided direct access to the south and east side of tower fifty's roof, this was, indeed, a convenient place for the casters to do their work. Since Delaporte's time, however, one can only lament how much that part of the temple has suffered from the clearing of the forest undertaken in the early 1900s by the *École française d'Extrême-Orient* (EFEO).

Comparing the original plaster cast and its copy made in France for the final reconstitution of the tower, one can see the way that Delaporte modified the proportions of the building and how he added decorative elements, for instance on both sides of the heads or at the base of the roof.

Visions of Angkor

Exhibited amidst genuine sculptures and plaster casts arranged in the same illogical and romantic display scheme, the drawings made by Louis Delaporte and various architects, gave the public a more complete vision of some of the more well-known

Fig. 11 Plaster cast of one side of a face tower from the Bayon temple. *Musée Indochinois* of the Trocadéro. Photo by Giraudon, c.1912 (Musée Guimet archives)

monuments in Angkor. Many of these have been published and can be found in several older publications devoted to Khmer art. Others are almost completely unknown and have only been recently restored. Conceived of by Delaporte and Henri Deverin, three of these drawings are supposed to show the front side of the Royal Palace in Angkor Thom during the time of King Jayavarman VII (late twelfth to early thirteenth century). These drawings offer a very suggestive depiction of the elephant terrace; in the background, they also display the entrance door (*gopura*) to the Royal Palace, half hidden by the terrace itself (Fig. 12). The various stairs and *naga* balustrades are perfectly rendered, but the Bayon-style tower represented on

Fig. 12 Ideal view of the Elephant Terrace in front of the Royal Palace, Angkor Thom. Ink and watercolour by Louis Delaporte and Henri Deverin, 1891 (Musée Guimet archives)

top of the staircase—quite logically if one considers the proper shape of that terrace—never actually existed. As was later demonstrated, the original structure probably consisted of wooden pavilions covered with tiled roofs.

In the drawings one notes the presence of a small waterway in front of the terrace. Quite accurately, Delaporte observed that—as is still the case nowadays—during the rainy season this part of the city could often be flooded. Recent excavations conducted by Jacques Gaucher in Angkor Thom proved that Delaporte's vision of the Angkorian capital city as a place criss-crossed by canals was not so inaccurate, though the canals must have been inconvenient for the kind of long boats that we see depicted in the drawings. The shape and ornamentation of these boats was inspired by some of the bas-reliefs enlivening the galleries of Angkor Wat and the Bayon.

In his second drawing showing the central part of the terrace, Delaporte (following an incorrect interpretation) placed the main gateway on a level with the top of the elephant terrace. This gateway, built long before the elephant terrace itself, was actually hidden behind the terrace and no longer visible from the so-called royal square in Angkor Thom by the close of the twelfth century. One last detail giving us an idea of Delaporte's inventiveness lies in the position he gave to the Phimeanakas, which was actually located inside the Royal Palace far from its main gateway and not really in line with it. Delaporte nevertheless shows this small temple on strictly the same axis as the gateway and, what is more, in such a way that one has the impression that the stairs leading to it bring visitors directly to the Phimeanakas. This is also a mistake. We don't know if these 'mistakes' were intentional or not. Indeed, they can be linked to a general attitude, prevalent among many nineteenth-century French architects who deliberately 'improved' the appearance of monuments like the Parthenon in Athens or 'reorganized' the monuments of the

Fig. 13 Ideal view of the Bayon temple, Angkor Thom. Ink and watercolour by Louis Delaporte and Henri Deverin, 1891 (Musée Guimet archives)

imperial forum in Rome. This particular approach betrays a rather well-established tradition that had been in existence since the eighteenth century.

The same kind of remarks can describe a third drawing showing another part of the elephant terrace, together with the Leper King terrace. The boat that appears in the foreground is exactingly copied from one of the Bayon bas-reliefs. This drawing offers a beautiful depiction of the northern staircase and of the terrace nearby that was to be restored more than a century later by Bernard-Philippe Groslier and Christophe Pottier of the EFEO. In this case, it is interesting to note the quality of the restitution of the two levels of the terrace that were completely dismantled at that time. One also has to note Delaporte's incorrect hypothesis about the presence of a majestic tower with four faces at this very spot. Delaporte interpreted some remains in this area as the crowning elements of a building that he thought once stood at the end of the terrace; in reality, no complete tower ever existed there.

Still, despite wrong hypotheses and a kind of general romantic approach to archaeology (Fig. 13), let us remember that these drawings and plaster casts created a foundation that deeply influenced later French and European scholarship. It seems obvious that this gathering of fragments of decoration, exhibited together with genuine sculptures, plans, and drawings of the monuments, would allow for easy comparisons between the different monuments and help to determine the many successive styles in Khmer art. This collection surely inspired Philippe Stern, the

well-known French art historian, who worked as an assistant to Louis Delaporte in the *Musée Indochinois* du Trocadéro (Coedes 1910). Stern's well-known method of dating Khmer monuments by comparing their specific decoration element by element was probably initiated by the inventory of these precious plaster casts that he made in the early 1920s.

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From Colonial Map to Visitor's Parcours: Tourist Guides and the Spatiotemporal Making of the Archaeological Park of Angkor

Michael Falser

> *[now we have to follow] the goal to make the ancient temples of Cambodia known to our readers who have not yet seen them and to enlarge their desire to visit them. On site, the access and conditions of a stay at the ruins improve very fast [. . .] Now we hope that the numbers of visitors increase in proportion to the sacrifices of the administration for making an excursion interesting. What we need now is that everybody who takes his journey to Angkor itself has a certain notion what he is supposed to see and that he is not left alone in the unknown world. . . [The visitor has to have] a general impression about the ruins of Cambodia [. . .] we need to publish vulgarizing notes on Angkor. [. . .] we have to develop] a method to gradually constitute a homogeneous ensemble and to adopt a rational program [. . .] a chronological order (Commaille 1910, 1–2)*[1] (Jean Commaille, the first Conservator General of Angkor, 1910).

Abstract This paper discusses the spatiotemporal formation process of the Archaeological Park of Angkor near Siem Reap in current day Cambodia. Within the time frame of the French rule in Indochina, it focuses on the first travel guidebooks created between 1900 and 1950, the most important of which were written by the first Conservators General of Angkor, Jean Commaille, Henri Marchal, and Maurice Glaize. This paper argues that these guidebooks were a powerful control tool used by the colonial authorities to realize a gradual and finally almost all-encompassing figuration of the spatiotemporal facets of the park for tourism purposes. Accompanying the administrative and legal delimitation of the park and within a traceable development from undefined conventions (1900–1909) and early attempts of vulgarization (1909–1913), to mechanization (1920s–1930s) and finally standardization (1940s–1950s), these guidebooks developed graphic maps, walking diagrams, circuits, itineraries, and a time-dependent *parcours* for

[1] All translations of French and German sources into English are by the author of this article.

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the park and inside the temples to regulate the visitors' object selection, body movement, time management, and visual orientation. Together with the structural conservation work affected in situ by the scientific staff, these guidebooks contributed considerably to the progressive decontextualization of the Angkorian temples from a living site of local social practice and (trans)regional Buddhist pilgrimage to a stylized heritage reserve of dead colonial archaeology—a conflict that became even more visible with the effects of globalized mass tourism after the inscription of the Archaeological Park of Angkor to the UNESCO World Heritage List in 1992.

Keywords Tourist guide • Archaeology • Architectural conservation • Parcours • Archaeological Park of Angkor

On Spatial and Topographical Turns and Tourist Guides in Colonial Contexts

In his introduction to *Topographien der Literatur*, the German art theorist Hartmut Böhme defined topographies (*topos* = location; *graphein* = inscribe/describe) as power- and control-related operations through which spaces are marked, prefigured, or prescribed towards time-dependent action, movement, performance, and routine. According to Böhme, cultural topographies—focusing on literary works with spatial descriptions (this is how we conceptualize tourist guides[2] for the Archaeological Park of Angkor)—generate spatiotemporal patterns of perception, mental orders, and cognitive maps as a result of cultural learning processes (Böhme 2005, xi–xxii). Following on the heels of what is being called a "spatial turn" (Bachmann-Medick 2009, 284–328) in cultural studies, space is not only the physical-territorial construct itself, but can be seen in relation to (in this case French-colonial) politics and territorial power. For the latter, techniques of spatial representations are central to the cartography/mapping of colonized space (or a space to be colonized) and remained, in this case, in direct combination with verbal commentaries for a leisure-oriented travelling public—one of the most common imperial strategies for the appropriation of space.[3] From this perspective, maps speak a cartographic

[2] For an interesting overview on travel-based literature on Angkor see Rooney (2001).

[3] "As much as guns and warship, maps have been the weapons of imperialism. Insofar as maps were used in colonial promotion, and lands claimed on paper before they were effectively occupied, maps anticipated empire. Surveyors marched alongside soldiers, initially mapping for reconnaissance, then for general information, and eventually as a tool of pacification, civilisation, and exploration in the defined colonies" (Harley 1988, 282). Editor's note: From this perspective, guidebooks for the popular tourist industry explaining "dead ruins" follow a comparable strategy as "prescriptive texts" of colonial instructions for conservators (compare the contribution by Sengupta in this volume), picturesque photography (compare the contribution by Weiler), and hybrid temple reconstitutions of plaster casts from Angkor in occidental museums (see Baptiste in this volume). All these typically colonial modes of "archaeologizing" heritage, as it is indicated by

language with "hidden political messages," are rhetorical images with an "ideological filtering" (Harley 1988, 292), and can generally be conceptualized as a social product.

This is what is most important in the context of early travel guidebooks to Angkor (compare introductory quotation): through the process of enframing, spatial descriptions and graphical maps helped the visiting tourist in "making the world intelligible as a systematic order [...] a hierarchically ordered whole" (Gregory 1994, 36) (a) to create, in his preparation at home or during his week-long boat travel to the site, the geographical imagining of an imperial entity between the European metropolitan centre and its Asian colonial margin; and (b) to conceive on-site with an inside and outside-construction the nature of a colonial possession—in this case the proclaimed cultural heritage objects inside an imaginary museum without walls or a culture reserve typified as a legal/administrative, aesthetic/geometricized entity called the Archaeological Park of Angkor. Following Lefebvre's approach of *The production of space*, the production mode of the colonial space of Angkor was threefold: The Angkor Park was (a) symbolically perceived as a "space of representation" of colonial power; (b) physically conceived as the "representation of space" through concrete boundary-making as a protected zone by the colonial administration; and (c) lived by the "spatial practice" of its users—in this case by the colonial visitors (and not the local stakeholders which follow until today quite different concepts of space and spatial circulation).[4] Based on the mental map of the 2D stage (the park) by the time of arrival and during his stay with the guidebook as script, the visitor's spatial practice (navigability) was—and this will form the main discussion of this paper—increasingly predetermined and therefore controllable as far as movement, time management, and visual regime (arrangement of views) were concerned. In the tradition of Foucault's analysis of space as an exercise of power and of the relationship between procedures in space (Foucault 1984), Michel de Certeau discussed the transmission of a cartographic a-perspectivity into a performative action—from "space" (*espace*) to "place" (*lieu*). He also talked about the relations of a map ("a plane projection totalizing observations"), graphic trails on a map as circuits and itineraries ("a discursive series of operations, chains of spatializing operations") and pathways and parcours (as a "spatial acting-out of the place"). De Certeau's spatial actions of "going" with the organisation of movements in relation to borders and barriers (Borsò 2004) were combined with speed indications ("velocities and time variables"), the calculation of distances and preselected views (the "knowledge of an order of places by tableau-like seeing").[5] Guidebooks

this volume's title, serve as a good basis for discussing the actually circulating virtual models of architectural heritage (compare the other case-studies in this volume).

[4] This threefold approach towards the production of space was convincingly introduced by the groundbreaking 1974 publication by Lefebvre. The quotations refer to Lefebvre's introductory chapter "Plan of the present work" (Levebvre 1991, 1–65).

[5] All these quotations are from part III, chapters VII (Walking the city) and IX (Spatial stories) (de Certeau 1988, 91–127).

on the Angkor Park, as travel guidebooks do in general to this day, predefined the visitors' selective reading competence of culture heritage, and predefined and dictated his on-site practice (from "route" to "routine"), but they also had a particularly devastating effect as powerful tools of colonial hegemony: they decontextualized the delimited park area from its larger sociocultural environment and eliminated the perception of Angkor as a site of 'living heritage'.[6] Maps and descriptions in the early guidebooks—and almost all of them were written by the so-called Conservators General of Angkor themselves—consciously ignored the existing socio-cultural fabric and spatial practices of Khmer villages in the surroundings of the temples, which had never ceased to be local and regional sites of veneration and pilgrimage. These guidebooks helped to 'archaeologize' Angkor, i.e. to perpetuate its image, surviving to this day as an empty, isolated, and dead site of forgotten ruins in the jungle that were rediscovered by the colonial power.

The Historic Context of the Spatiotemporal Figuration of the Angkor Park

The programmatic position of the introductory quotation (see above) was determined in 1910 by the former civil servant Jean Commaille who was appointed the first Conservator General of the temple group of Angkor in 1908 by the *École française d'Extême-Orient* (EFEO), at the newly established French institution for the research and preservation of Indochinese heritage. In consideration of the fact that the French protectorate in Indochina was established in 1863, one wonders why such a proposal to vulgarize the European gaze on Khmer heritage *in situ* was announced comparatively late. Early images on Angkor Wat demonstrate aspects of the cultural-political perception of Khmer heritage in France before 1900. After first depictions by Henri Mouhot and in Francis Garnier's *Voyage d'exploration en Indo-Chine* from 1873, Louis Delaporte's *Voyage au Cambodge. L'architecture Khmer* from 1880 popularized Angkor for a larger public (Delaporte 1880). Delaporte was part of the explorative Mekong-mission in 1873 and saw Angkor Wat in an overgrown and decayed state partly occupied by the monks' wooden houses (compare Fig. 4). However, in his own book from 1880 Delaporte published an idealized reconstruction drawing of the temple (he called it "vue reconstituée") with an imagined lively and local traditional crowd on the central causeway[7] (Fig. 1).

[6] Editor's note: New approaches in conservation and architectural preservation discuss the aspect of living heritage in a very different way and try to incorporate local knowledge into new strategies of conservation (see the contributions by Warrack, Chermayeff, Sanday in this book) and describe the local stakeholders inside the park as dynamic users of the ancient land-use patterns (see the essay by Luco in this volume).

[7] See Delaporte's drawings in the essay by Pierre Baptiste in this volume.

Fig. 1 One of the earliest depictions of the temple of Angkor Wat, in Louis Delaporte's *Voyage au Cambodge. L'architecture Khmer* of 1880 (Source: Delaporte 1880, 206–7)

This folkloristic scenario inhabiting the central perspective towards a fully reconstructed temple silhouette (the real monks' houses, however, were eliminated both in picture and reality) strongly predefined the visitors' expectations of the real site in the years to come. The perspective of the so-called archaeological heritage of Cambodia changed considerably in the three decades after the 1870s. On the archaeological survey map of the ancient temples by Lunet de Lajonquière, the captain of the colonial infantry, in 1901, the temples of Angkor still belonged to Siam (today Thailand) (Lunet de Lajonquière 1901) and the French appropriation of this much desired heritage through the process of mapping hardly touched upon the real temple site (Fig. 2a). However, by 1907 the Franco-Siamese Treaty had brought the north-western provinces of Battambang and Siem Reap (with Angkor) into the French protectorate of Cambodia. As a consequence, the temples of Angkor were not only converted into the propagandistic showcase of the French *mission civilisatrice* through the applied sciences of archaeology and architectural preservation (Fig. 2b shows Lajonquière's 1907/1911 inventory of a densified archaeological mapping which was conceptualized as the Angkorian temple zone, see the red-lined rectangle) but also into a major travel destination for the fast-growing transcontinental tourist industry.

In this latter project, three points of observation structured the following argumentation: First, it is an often-discussed fact that universal and colonial exhibitions in the second half of the nineteenth and first half of the twentieth century in Europe displayed colonized (appropriated) heritage from overseas colonies in a supposedly

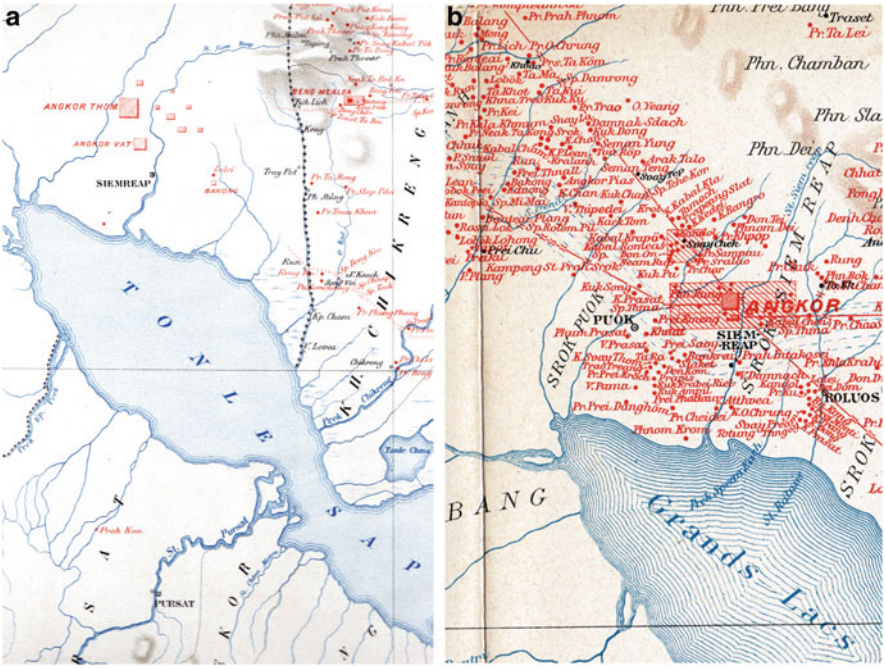


Fig. 2 (**a**, **b**) Lunet de Lajonquière's archaeological mapping of the Angkorian temples before (*left*) and after their retrocession from Siam in 1907 (*right*) (Source: (*left*) Lajonquière 1901, map (detail). (*right*) Lajonquière 1911, map (detail)

scientific and strict visual order. Visitors to these mega-events and all other citizens of colonizing nations were to receive a carefully pre-selected and well-organized notion of the colonized countries, their people, and their heritage before they eventually ventured out to visit these places in their original setting.[8] Surprisingly, the ordering features and display modes of these European exhibitions of the colonies can be detected in early travel guidebooks, and the French-colonial ones on Angkor are particularly designed for that purpose. Through them a visitor could, either at home or on the week-long boat journey from Europe to Indochina, perfectly prepare himself for what, when, how long, and how to see Angkor's glorious heritage. Second, the so-called vulgarization of the Angkor temples through detailed travel guides was primarily led by the French Conservators General of Angkor themselves and these guidebooks dominated the tourist industry of Angkor heritage until the early post-war period, after the Cambodian independence in 1954 and beyond. Additionally, almost all French travel literature on Angkor was to some degree initiated, published, and/or financed by institutions,

[8] For one of the classic thoughts on preparing the occidental view for oriental sites through exhibitions, see Mitchell (1989).

committees, and societies that had a clear ideological interest in a proper presentation of this marvel of French-colonial *patrimoine* (see Commaille's introductory statement of 1910, compare Rooney 2001). Finally, the third observation: As we focus on travel guides between 1900 and the late 1950s, these early attempts to prepare a supposedly purely *archaeological* temple zone of Angkor for colonial mass tourism underwent four major developmental stages in correlation to the latest technological achievements in the West: from undefined conventions (1900–1909) and early vulgarization (1909–1913), to mechanization (1920s–1930s) and standardization (1940s and later).

Undefined Conventions (1900–1909)

The 1902 edition of the so-called *Guide Madrolle* sent the visitor on a pre-arranged 100-day journey from Marseille to northwest Africa, to India and Indochina, and then to Canton and was published by the *Comité de l'Asie Française*.[9] At this time Angkor was still on the Siam side and was reached from French-colonial Saigon. The "traveller under time pressure" (limited time continues to be a feature of Angkor tourism to this day) arrived after a tiring journey with the French post boat lines from the Cambodian capital Phnom Penh via the Tonlé Sap lake to the fortified village of Siem Reap, still quite an uncomfortable place to stay. Due to the tight boat schedule, the visitor was given only two days to see the twelfth-century temple of "Ang-kor Vaht" (dated to the first century CE!) and "Ang-kor Thom" (dated to the fifth century BCE!). Even if no round trips were indicated and the map gave an even more 'lost-in-the-remote-jungle-without-people' impression (Fig. 3b) than the original map in Garnier's 1873-publication (Fig. 3a), Angkor Wat was described as a lively pilgrimage place containing a Buddhist sanctuary with camping pilgrims and resident monks who were in charge of the care of this well-preserved temple and its idols.[10]

The topos of the actively venerated and locally visited site at Angkor with its lively celebrations by caring monks and believing Cambodians was reconfirmed in several publications like *Les ruines d'Angkor* by Jean-Baptiste Carpeaux in 1908[11] but declined sharply when the official guidebooks came into being. Only in very few popularized photographs of this time, like the well-known trilingual

[9] This committee published its first *Bulletin* in 1901 and tried to cover all sorts of economical, diplomatic, ethnic, social, and religious information about the French world overseas (Zimmermann 1901).

[10] "Ang-kor Vaht. Le 'temple de la cité royale' est encore de nos jours un sanctuaire du bouddhisme, là campent des pèlerins dévots et un peuple de bonzes. Ce sont ces derniers qui sont chargés de l'entretien des ruines et de la garde des idoles. Ang-kor Vaht est le monument khmer le mieux conservé" (Madrolle 1902, 54–55).

[11] Even if he admits "to have understood nothing," Carpeaux reports of hundreds of monks and Cambodian people in the famous cruciform gallery of Angkor Wat during New Year celebrations with "répresentation thèatrale, chants, danses, et comédie" (Carpeaux 1908, 225–227).

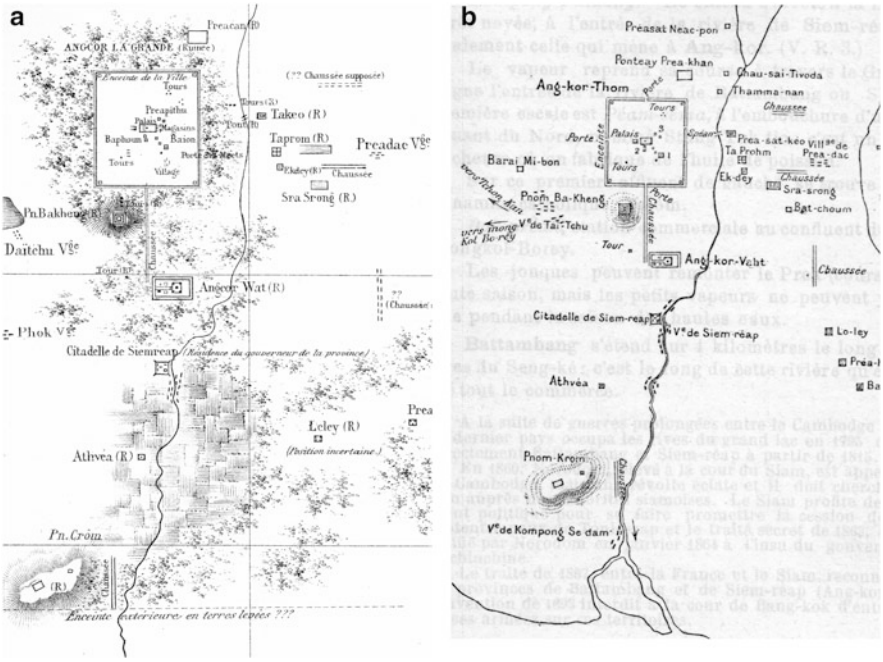


Fig. 3 (**a**, **b**) The temples of Angkor on a map of Francis Garnier's *Voyage d'exploration en Indo-Chine of 1873* (*left*) and in *Guide Madrolle: De Marseille à Canton* of 1902 (*right*) (Source: (*left*) Garnier 1873, part 1, plate I, (*right*) Madrolle 1902, 50–51)

publication *Indochine pittoresque et monumentale. Ruines d'Angkor* by Pierre Dieulefils in 1909 (Fig. 4), can one see that dominant parts of Angkor Wat were still occupied by the monks' houses: even the eastern end of the central passageway that had been iconized by Delaporte's 1880 visionary perspective was still occupied. Another image by Dieulefils shows the wooden house of the Angkor Conservator Jean Commaille who came to the site in 1908.

The 'archaeologizing' attitude towards built cultural and living heritage was in first full swing around the same time that Lajonquière was working on his third volume of an archaeological inventory on Indochinese temple structures (this time including the newly colonized territory around Angkor) and transferred the supposedly propagandistic number one temple of Angkor Wat into an abstract inventory list with a rationalized number of "497" (Lunet de Lajonquière 1911, 91–116 on Angkor Wat)—next to the unknown little temple of Ta Prohm Kel with number "498". Dieulefils probably published, together with images on the Angkor temples, the first popular version of a colonial classifying gaze on Khmer cultural and physiognomic expressions (Dieulefils 1909). The colonial appropriation through listing, mapping, and textual and photographic inventories comprised archaeological and social dimensions alike—Angkor and its famous Apsara dancers being no exception. As one of the last examples of the experimental phase of visualizing

Fig. 4 The temple of Angkor Wat with wooden houses of Buddhist monks in Dieulefils' *Ruines d'Angkor* of 1909 (Source: Dieulefils 1909, 11)

Angkor, one should mention the imagined sketchy aerial perspectives of Général de Beylié's 1909 publication *Les ruines d'Angkor* (Fig. 5), which took the early aerial perspectives of Delaporte's drawing from 1880 a bit further (de Beylié 1909):[12] The axial orientations of a site with no traces of any human settlements were monumentalized ad infinitum. And whereas the real aerial shot of the Angkorian territory was still missing, the first detailed map of the whole Angkor region had been established in 1908 by the geodesist Buat and the topographer Ducret: the fully archaeologized vision of the Angkor temple site was established (Fig. 6).

Early Vulgarization (1909–1913)

Jean Commaille was educated as a soldier. He joined the Cambodian militia in 1896, worked as civil servant for the French protectorate, became involved in the EFEO in Saigon and Hanoi, executed archaeological surveys in Cambodia, and

[12] Editor's note: These first virtual versions of aerial views and ideally reconstituted temple structures are quite comparable with actual virtual models derived from aerial photographs (compare Gruen's essay in this volume, also the Angkor images in Nguonphan's contribution).

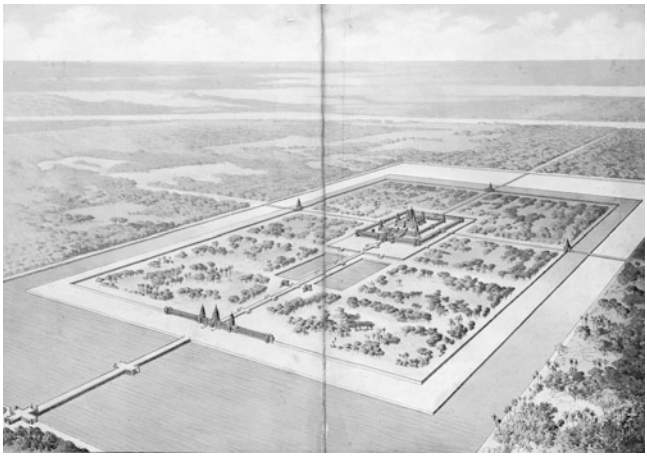


Fig. 5 Angkor Wat in an imagined aerial perspective (*vue cavalière*) in Beylie's *Les ruines d'Angkor* of 1909 (Source: de Beylié 1909, n.p.)

finally became the first Conservator General of Angkor in 1908—just one year after the so-called 'retrocession' of Angkor from Siam to French-Cambodia.[13] Together with Lajonquière and the chief archaeologist of the EFEO, Henri Parmentier, who strongly supported the idea of bringing international "globe-trotters"[14] to Angkor (comparing it to existing tourism at the Egyptian pyramids or the Javanese temple of Borobudur in the Dutch Indies) drew up a twofold plan for Angkor: (1) the so-called vulgarization of Angkor for a larger, international forum through the print media; and (2) the establishment of a fast

[13] A short biography on Commaille in: Drège 2002, 107–110.

[14] "Assurer l'existence et les moyens d'étude à Angkor aux visiteurs n'est pas suffisant, il faut faciliter le voyage, encore aujourd'hui difficile et seulement possible pendant une courte partie de l'année [. . .] Il est inutile d'insister sur les avantages qu'il y aurait pour toute l'Indochine et en particulier pour Phnom-Penh à attirer sur Angkor la visite des globe-trotters. Or, à cette heure, peu de visiteurs étrangers font ce voyage. Alors que j'ai vu les registres du Boroboudour couverts de noms non seulement Hollandais, mais Anglais, Américains, Allemands, etc., les Français, et à cause seulement de leur présence en Indochine, représentent la grande majorité des rares visiteurs d'Angkor. Il y a à cela plusieurs raisons; la première, c'est l'ignorance même de ces ruines; [. . .] Mais c'est aussi, même auprès des gens éclairés, la difficulté d'atteindre Angkor; c'est aujourd'hui presque une exploration, et tandis qu'on sait d'avance, en quittant Londres ou New York, à quel moment et comment on pourra aller visiter les Pyramides ou l'île de Philé en Égypte, l'on ne sait d'Angkor ni à quel moment ni comment on pourra s'y rendre. Obtient-on des renseignements détaillés? Le délai est si court pendant lequel on peut faire agréablement cette excursion, qu'il est difficile d'enfermer cette date précise, dans le cadre d'un grand voyage. Il faut donc pour attirer les visiteurs étrangers: 1° faire connaître l'intérêt des ruines, et c'est à la Société d'Angkor qu'une telle tâche revient naturellement; 2° établir une communication aisée avec Phnom-Penh; 3° faire qu'elle soit permanente" (Parmentier 1908, 68).

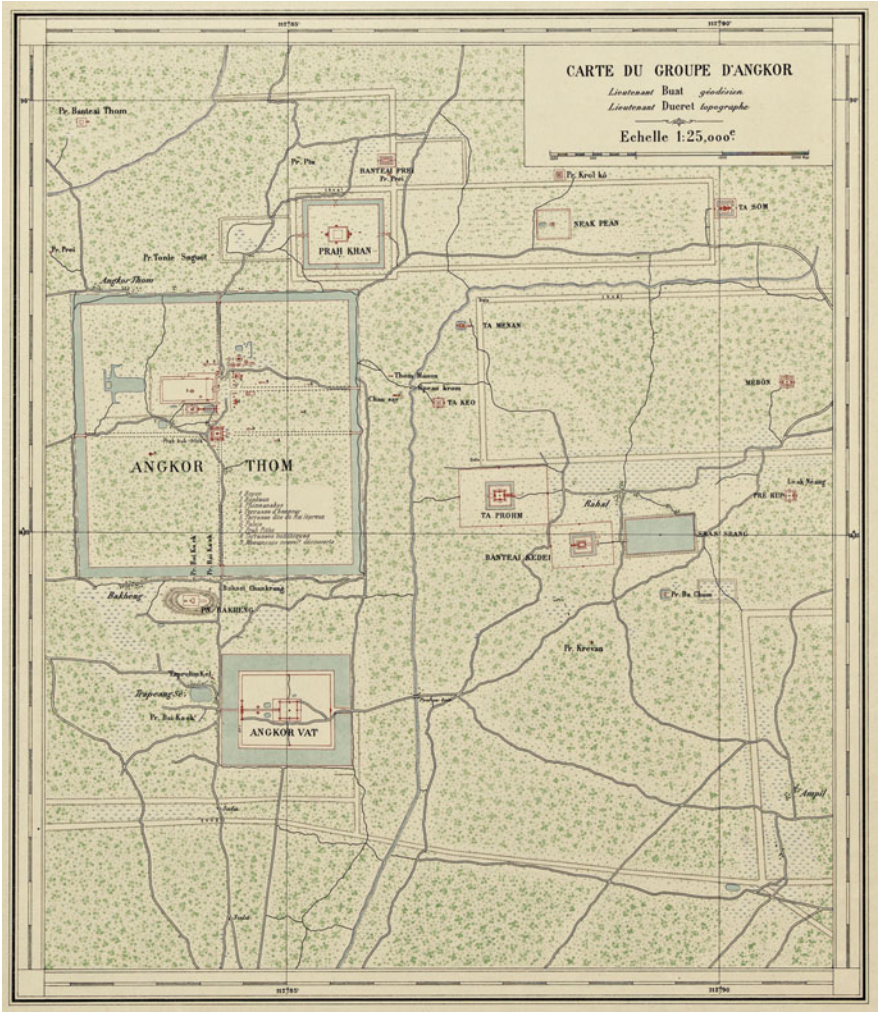


Fig. 6 The first detailed map of the Angkor region by Buat/Ducret for the EFEO in 1909 (ANOM Archives Nationales d'Outre-Mer, Aix-en-Province)

and representative access to the main temples including a functioning tourist infrastructure. His work reports from 1907 onwards[15] show that, besides works in the temple city of Angkor Thom, he primarily focused on Angkor Wat's central axis where he even set up his own house. The early turning point in the French-colonial translation of the temple as a living social site into an object of 'dead' colonial archaeology was, without a doubt, the enforced resettlement of the

[15] Chronique (Cambodge). 1907–1909. *Bulletin de l'École française d'Extrême-Orient* 7: 419–423; 8: 287–292 and 591–595; 9: 413–414.

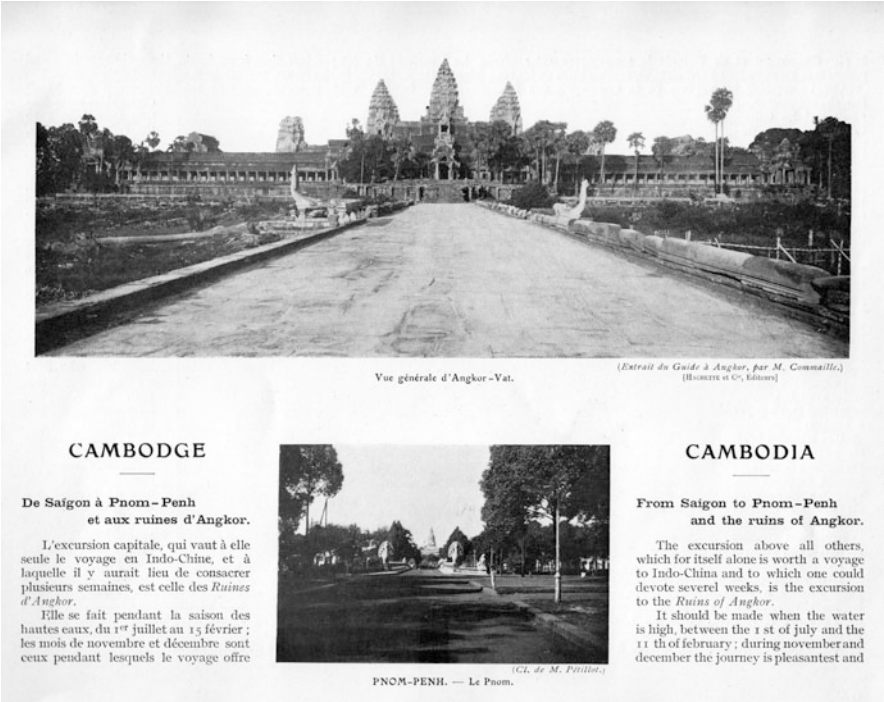
Buddhist monks from the western second enclosure because they supposedly blocked the "vue générale"[16] from the entry gate as Delaporte had introduced it to the Western world thirty years before. The newly founded *Société d'Angkor pour la conservation des monuments anciens de l'Indochine* financed this undertaking.[17] In 1910, Lajonquière published his travels to Indochina in the popular Journal *Tour du Monde* and conceived Angkor, comparable with the Madrolle-guide of 1902, as an important tourist stop through Southeast Asia. One year later, he presented his third inventory on Khmer temples after 1902 and 1907, which finally covered the Angkor region and was consequently incorporated into the cataloguing and classifying heritage protection system of the French-colonial administration. According to Lajonquière, it was he who had proposed the name *Parc d'Angkor* for supposedly the "most beautiful of all archaeological possessions in the world."[18]

The first comprehensive *Guide aux ruines d'Angkor* was published in 1912 by the Conservator General Jean Commaille. It comprised 243 pages, 154 engravings and three plans, seven chapters with information on the travel access from Saigon via Phnom Penh by boat, the history and architecture of Angkor, seventy six pages on Angkor Wat, and ninety pages on Angkor Thom. Besides an old-fashioned map with a clearly pronounced road network between the temples and an imagined aerial perspective (this dimension was still not accessible in reality), he could finally—in combination with the new medium of photography—offer the tourist world a giant overall central perspective of the temple from the western entry gate that was totally cleared of vegetation and human beings (the rituals and preserving

[16] "Pour rendre à l'ensemble du monument son aspect primitif, on devait d'abord songer à reconstituer l'unique avenue dallée. Il fallait aussi envisager la nécessité de déloger les bonzes dont les habitations masquent toute la face Ouest de la première galerie, dite 'galerie historique', et interdisent une vue générale. Nous espérons qu'il sera possible de les décider à transporter leurs demeures au Nord ou au Sud, en dehors de la terrasse de pourtour" (Chronique (Cambodge). *Bulletin de l'École française d'Extrême-Orient* 8 (1908): 593).

[17] See their constituting guidelines in *Bulletin 1* (1908), edited by *Société d'Angkor* in Paris. Editor's note: This issue of relocation from so-called heritage sites is a common feature in colonial and other violent regimes (compare Pichard's essay on Pagan under the military regime in this volume). Over the course of the last decades, a new appreciation of the local stakeholders, has, however, changed these severe actions (compare the contributions by Warrack and Luco in this volume).

[18] "Ma première étape doit être Angkor. Les grandes ruines de l'ancienne capitale cambodgienne ne sont plus siamoises, elles nous appartiennent maintenant, de par le traité de mars 1907: Tout le monde est pris d'un beau zèle: la Société d'Angkor s'est fondée à Paris pour veiller sur elles; l'EFEO assumera la charge de leur conservation; les Beaux-Arts songent à en dépouiller les Colonies et le Gouverneur général vient de me donner à leur sujet plusieures instructions: dresser une carte, débroussaillement [. . .] Le Traité de 1907, en nous remettant la garde de ces oeuvres d'une école architecturale disparue, nous a créé des grandes obligations: celle de les conserver, celle de les faire mieux connaître, celle de les rendre aisément accessibles à tous. C'est à l'EFEO, gardienne née des richesses archéologiques de l'Indo-Chine française, que sera confiée la mission de parer à ces obligations. Elle a vaillamment conquis son rang parmi les milieux scientifiques et on peut être assuré, si les moyens financiers ne lui sont pas trop mésurés, qu'elle mènera à bien cette tâche" (Lunet de Lajonquière 1910, here 386 and 397).



(Extrait du Guide à Angkor, par M. Commaille.)
(Hachette et Cie, Éditeurs)

Vue générale d'Angkor-Vat.

CAMBODGE

De Saigon à Pnom-Penh et aux ruines d'Angkor.

L'excursion capitale, qui vaut à elle seule le voyage en Indo-Chine, et à laquelle il y aurait lieu de consacrer plusieurs semaines, est celle des *Ruines d'Angkor*.

Elle se fait pendant la saison des hautes eaux, du 1er juillet au 15 février ; les mois de novembre et décembre sont ceux pendant lesquels le voyage offre

(Cl. de M. Pétillot.)

PNOM-PENH. — Le Pnom.

CAMBODIA

From Saigon to Pnom-Penh and the ruins of Angkor.

The excursion above all others, which for itself alone is worth a voyage to Indo-China and to which one could devote severel weeks, is the excursion to the *Ruins of Angkor*.

It should be made when the water is high, between the 1 st of july and the 11 th of february ; during november and december the journey is pleasantest and

Fig. 7 The giant and 'civilized' central causeway of Angkor Wat (*above*) by Commaille in the publication *L'Indo-Chine. Guide-Album à l'usage des touristes* by the Touring-Club de France (1911) and the newly designed central axis of colonial Phnom Penh by architect Fabre (*below*) (Source: Touring-Club de France 1911, 11)

actions of the monks were now criticised)—a French-colonial jewel that, according to Commaille, easily surpassed all "architectural treasures of British-India and the Dutch Indies" (Commaille 1912, 32). His aesthetic creation of a civilized and tamed Angkor Wat was even incorporated into the French and international tourist industry some months before his own guide: in a publication by the French Touring-Club/Committee of Colonial Tourism of 1911, Commaille's purified 350-m long *grande axe du monument* (Commaille 1912, 32) was directly set in relation to the modern axial urban and Khmer-stylized plans of the French architect Fabre in Phnom Penh (Touring-Club de France 1911) (Fig. 7).

Commaille's vulgarizing approach to Angkor included simplified and almost comic-like sketches of the general building techniques of Khmer temples. He introduced new ways of guiding the visitors' movements and visual attention through the enormous ensemble with details of floor plan sketches that correlated to his guiding text passages in the "now we follow... now we ascend, turn left, now look here"-style (compare with de Certeau's theory of *parcours* above). Approaching from the western entry gate the visitor had to circulate within the

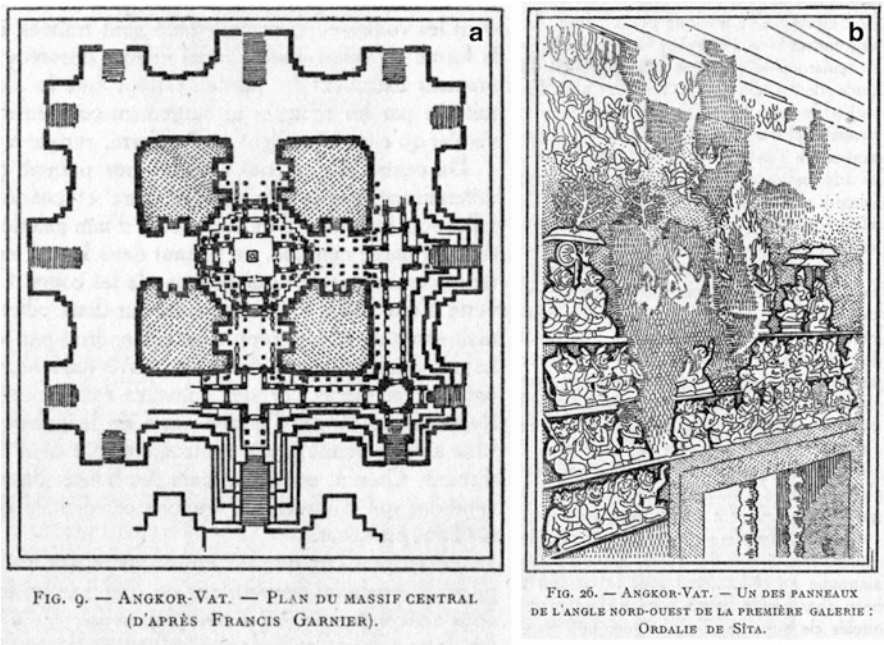


Fig. 8 (**a**, **b**) Sketch maps of the ground plans (*left*) and perspective drawings of the bas-reliefs (*right*) of Angkor Wat in Commaille's *Guide aux ruines d'Angkor* (1912) (Source: Commaille 1912, 35 (Fig. 9), 87 (Fig. 26))

two inner enclosures until reaching the very top of the sixty-five metre tall central tower to finally enjoy the spectacular view over the civilized ensemble in the middle of dense tropical forest. Additionally, Commaille now introduced page-long explanations of the bas-reliefs with their mythological scenes, battles, and religious scenes. Along with some detailed photos, he added perspective and interpretive sketches on the bas-reliefs that guided and even preselected the gaze of the visitor toward the smallest detail (Fig. 8a, b). Along with this love of archaeological details, Commaille's guide introduced a critical undertone against any social action on site by the present monks of the temples as unscientific and harmful,[19] a significant contrast to earlier publications where the monks had been seen as daily guardians and preservers of the temples.

In the same year of 1912, more guides and travel literature in French, German (Suter 1912), and English were published—some of them in clear reference to Commaille's publication—even *National Geographic* published a photo-essay on

[19] It is interesting to note Commaille's remark that the replacement of missing parts of Angkor Wat with re-used round columns taken from other parts of the temple was a harmful and primitive intervention by the actual monks. In reality, these interventions had already been undertaken in the sixteenth century CE when Angkor experienced a cultural and religious (Buddhist) revival.

the *Forgotten ruins of Indo-China* written by Jacob E. Conner. Commaille himself popularized his work in the German *Ostasiatische Zeitung* in 1913 with a two-part publication comprising sixty pages (Commaille 1913). Finally—and this marked the endpoint of the first phase of vulgarization of Angkor in the tourist sector—the *Guide Madrolle* issued a new and updated version of its Indochina guidebook, with Angkor now being touted as the final goal of travel. This guidebook announced that the journey from Saigon had shrunk to a two-day journey, that a road connection for automobiles now existed, and that a comfortable hotel had been built in front of Angkor Wat. The *aller-retour* trip was now possible in one week (in 1902 it was eleven days), but the stay at Angkor itself was still advertised as a hurried two-day visit. However, the tourist map of the so-called *Parc d'Angkor*[20] reached an unseen precision, even if an almost obligatory pathway through the temple field was not yet officially established.

Mechanization and New Dimensions (1920s–1930s)

The late 1920s and 1930 were the pre-war heyday of conservation work in Angkor. The first phase of clearing the temples of vegetation and getting the overall area under control was finished, and the institution in charge, the EFEO, could undertake specific and more detailed tasks. As a tragic side story, Jean Commaille had been assassinated by bandits in the Angkor Park in 1916 and Henri Marchal[21] (Paris 1876–Siem Reap 1970), a trained Parisian École des Beaux-Arts architect, became the Conservator General of Angkor in the 1920s. Marchal's *Guide archéologique aux temples d'Angkor* from 1928 (published in English in 1930 and 1933) fit perfectly into the established tourist routes around Indochina (Marchal 1928, 1930). Inside the park, picturesque and camera-ready landscaping was initiated and the iconic repertoire of Angkor Wat was enlarged with a new and, to this day, very popular tourist perspective: the off-central pathway motif with the mirroring of the five tower silhouette in the northern or southern water basins, including branches of carefully preserved individual trees (Fig. 9). Just a few years before these emerging efforts of staging the Angkorian ruins as a park-like design in the mould of European viewing habits, the park itself was officially created as an administrative entity: On 30 October 1925, the *Parc archéologique d'Angkor* ("une zone réservée comprenant les principaux monuments archéologiques du groupe d'Angkor") was established by decree (*arrêté*) of Maurice Monguillot, *Gouverneur général de l'Indochine*. Its limits were fixed one year later by decree

[20] The section on Angkor covers eighteen pages with several unfolding plans of selected temples (Madrolle 1913, 35–52).

[21] A short bibliography on Henri Marchal, see Drège 2002, 117–120.

Fig. 9 Angkor Wat's newly invented picturesque perspective in Henri Marchal's *Guide archéologique aux temples d'Angkor. Angkor Vat, Angkor Thom et les monuments du petit et du grand circuit* from 1928 (Source: Marchal 1928, 49)

on 16 December 1926 by François-Marius Baudoin, *Résident supérieur au Cambodge* and a map published in 1930 (Fig. 10).[22]

Whereas the tourist's circulation radius in Commaille's guide from 1912 was intended for the age of ox carts, horses, and elephant riding, the concept of Marchal's guide in 1928 was based on new transportation and research means: the car and the airplane. Aerial photography had been introduced as the third dimension for archaeological research via war-related reconnaissance flights. Orthogonal aerial shots were puzzled into a coherent map of Angkor that helped to form an understanding of the ancient settlement and water system and a complete visitor's circulation system was established (Fig. 11a, b). Henri Marchal invented the so-called *Petit Circuit* and *Grand Circuit* that perfectly catered to time-pressed tourists rushing from one temple to another. In comparison to the first detailed Angkor map in 1909, which at least partially mapped the existing road and path system of the local inhabitants, Marchal's map strongly "geometricized colonial space" (Dünne 2009, 57) with his new touristic-archaeological access system made of a rectangular grid of roads. Furthermore, the automobile was a newly introduced

[22] Both documents, *Arrêté créant le parc archéologique d'Angkor (30 octobre 1925)* and *Arrêté dé liminant le parc d'Angkor (16 décembre 1926)* were published in *Bulletin de l'Ecole française d'Extrême-Orient 26* (1926): 677–678 and 680–681. The map see in *Bulletin de l'Ecole française d'Extrême-Orient 30* (1930): plate XXXII (242–243).

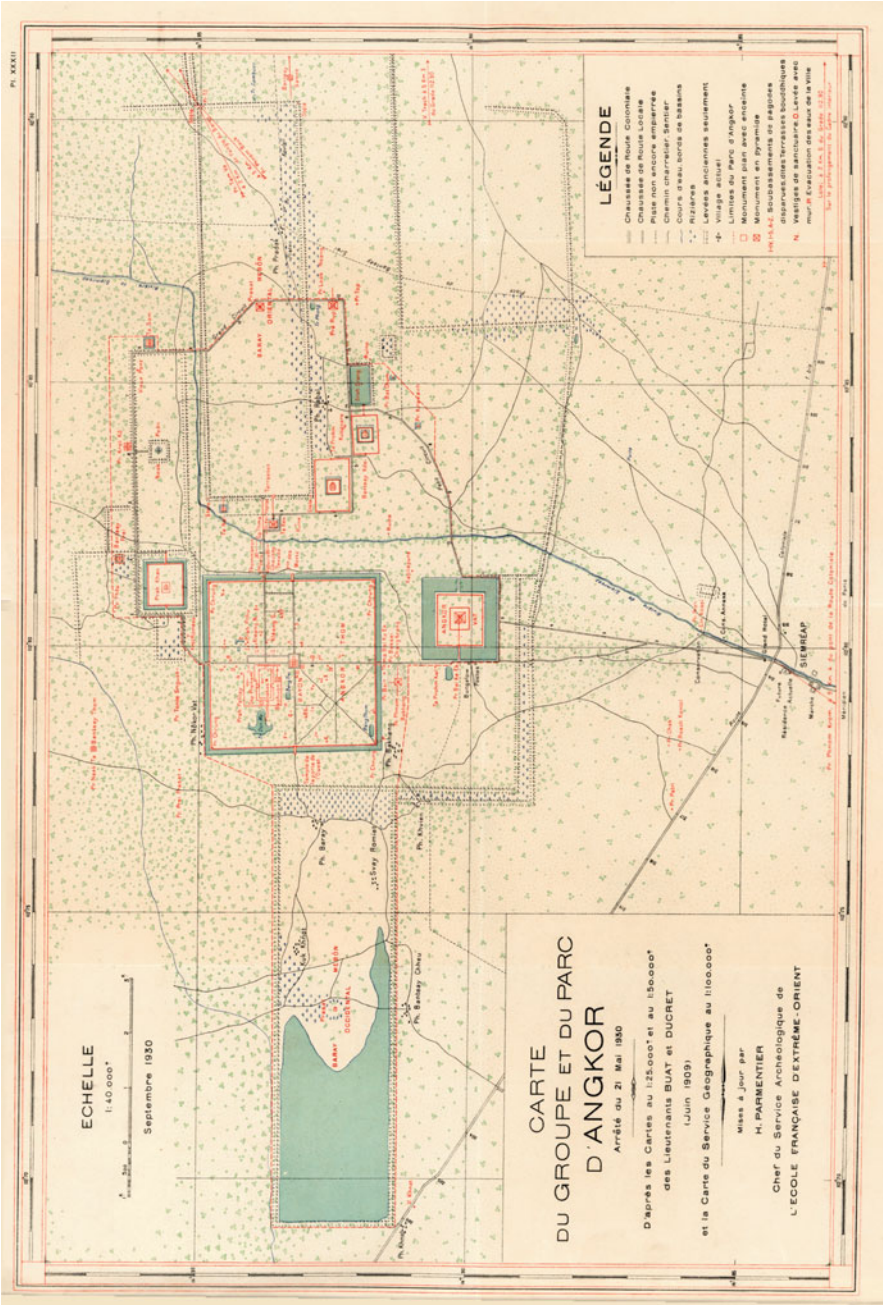


Fig. 10 The delimination on the *Carte du groupe et du parc d'Angkor* based on the area map of 1909, updated by Henri Parmentier, Chief of the archaeological service at the EFEO on the base the governmental decree of 21 May 1930 (Source: Bulletin de l'École Française d'Extrême-Orient, 30 (1930): 242 (Planche 32))

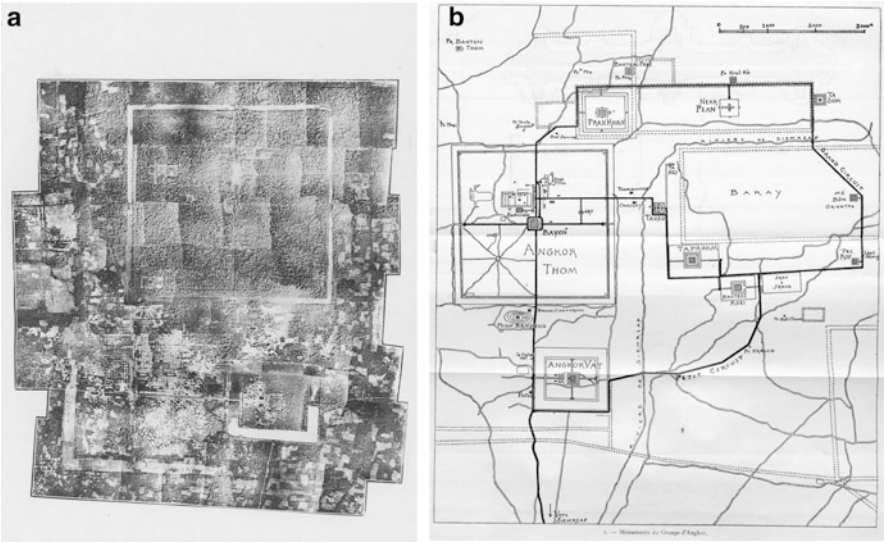


Fig. 11 (**a**, **b**) The zone of Angkor in a photo puzzle taken during reconnaissance flights (*left*) and the invention of the visitors parcours as *Petit et Grand Circuit* (*right*), presented in Henri Marchal's *Guide archéologique aux temples d'Angkor. Angkor Vat, Angkor Thom et les monuments du petit et du grand circuit* from 1928 (Sources: 11a: EFEO Archive 12544. 1, 11b: Marchal 1928, 220)

means of transport and Marchal's guidebook indicated the distance of each temple from the bungalow near Angkor Wat.[23] In order to extend the actual visiting time during a two-day Angkor tour, Marchal suggested highlights for a visiting programme that included the hill temple of Phnom Bakheng for sunset and Angkor Wat (after it had been cleared of its living Buddhist monastery) or Bayon during a full moon. Nevertheless, Marchal regretted the never-ending tourist rush and proposed—as a vernacular side stop mentioned for the first time in a guidebook on Angkor—a visit to the "indigenous villages with their stilted houses necessary for inundation in the season of high water [. . .] a *tableau rustique* and amusing for

[23] Or as Marchal himself put it: "That means that one can see more in the same limited time [. . .] I just give some special indications, how to get there, distinguishable characteristics of the individual temples and details of special attention. [. . .] The tourist under time pressure who cannot visit all temples can focus on every temple's speciality and make his choice according to his taste." And furthermore he stated: "Fifteen years ago one could not imagine finding his way—then only with a lot of time and with the only transport available with a bull carriage or a horse—through the meandering pathways which lead through the diverse monuments of Angkor. Today, a network of roads navigable by automobiles links all the principle monuments of the Angkor group and allow the visitor to reach even the furthest temples in a minimum of time: they are inscribed in the so-called Large and Small Circuit. That means one can see much more in the same limited time" (Marchal 1928, v–vi).

the lovers of exotic spectacles" (Marchal 1928, 203).[24] However, the enforced speed of this early kind of mass tourism had its downside in the one-dimensional focus on a purely "archaeological" heritage. Marchal discovered a certain indifference and disrespect towards the temples on the part of visitors and mentioned legal punishment for any kind of vandalism, graffiti, and theft. He also announced that original pieces and moulded copies of original statues were on sale by the EFEO in a pavilion in front of Angkor Wat or at the Musée Albert Sarraut in Phnom Penh.[25]

But even the advent of faster boats from Saigon and two paved circuit roads for automobiles in the Angkor Park did not seem enough to satisfy the growing tourist industry. In order to "satisfy the universal desire to visit the famous ruins" (Bontoux 1929, 3) and to overcome the time-consuming boat travel still required between Saigon and "the remote civilization of Angkor," the Saigon head office of Tourism Indochina launched aerial tourism in 1929. In a bilingual English–French PR brochure, the third dimension—until now only accessible by military reconnaissance flights—was for the first time available to tourists. After a one hour and forty-five minutes flight from Phnom Penh, the act of landing with a hydrofoil airplane right on the moat of Angkor Wat reduced to mere toy miniatures (along with the other cities on the way) this and other temples, which only twenty years before had been inaccessible to human beings in their supposedly impenetrable forest (Fig. 12a, b). As the brochure stated:

> To arrive over Angkor in full flight, at a thousand metres of height, to see below in striking miniature and like a precise synopsis, the stately ruins developed in the folds of the millenary forest [...] An infinity of sensations of which nothing else can give an idea [...] There is, perhaps nothing more splendid than to take in at a glance the whole spectacle. (Bontoux 1929, 11)

From this date, the aerial perspective on archaeological heritage was popularized in Indochina, which was by that time already completely connected and accessible for mass tourism by boat, train, road, and airplane[26] (Fig. 13).

Standardization (1940s–1950s)

The last phase of the great Angkor guidebooks during the 1940s and 1950s brought only a few important innovations but standardized the visiting behaviour of the growing, now internationalized, tourist masses in the post-war period to come.

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[24] Editor's note: This banalization of the local scene as *tableau rustique* was also introduced by picturesque photography (compare the contribution by Weiler in this volume), but continues, to a certain extent, today in the global tourist industry (compare Chermayeff).

[25] Compare Baptiste's discussion of plaster casts in this volume.

[26] Two publications, above all, exemplify the highly individualized touristic circulation using many folding maps of overall travel routes inside Indochina (including their international connections to Thailand, Malaysia, and even China) and individual tour suggestions with detailed individual maps and information about hotel, restaurants, scenic spots, and even gas stations (Nores 1930; Gauthier 1935).

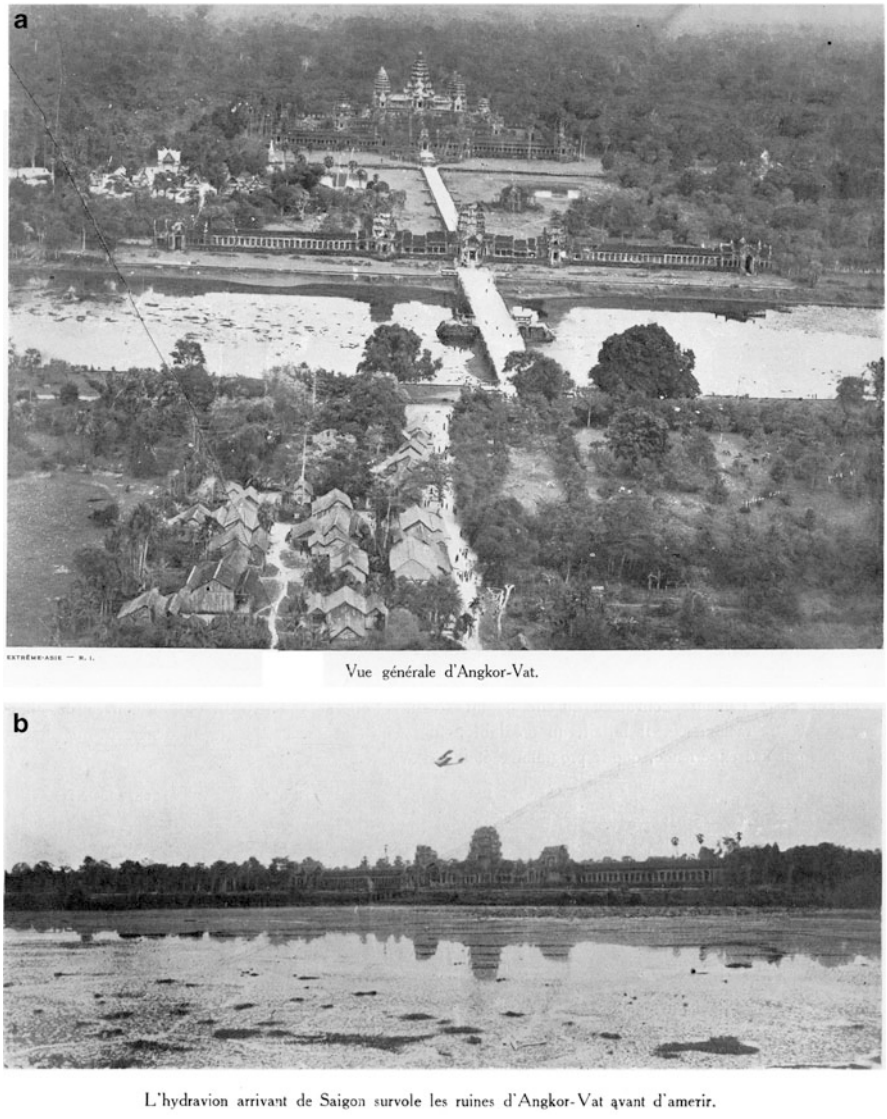

Fig. 12 Angkor Wat in one of the earliest aerial views for the emerging tourist industry in the brochure *Tourisme aérien en Indochine* (1929) (Source: Bontoux 1929, 9, 11)

Maurice Glaize (Paris 1886–La Rochelle 1964), the Conservator General of Angkor between 1937 and 1947, was an *École des Beaux Arts*-trained architect from Paris. He focused his work on many other temples in the greater Angkor area and published his guidebook *Les monuments du groupe d'Angkor* in 1944 (second edition in 1948) with an already canonized choice of illustrated viewpoints. Glaize's

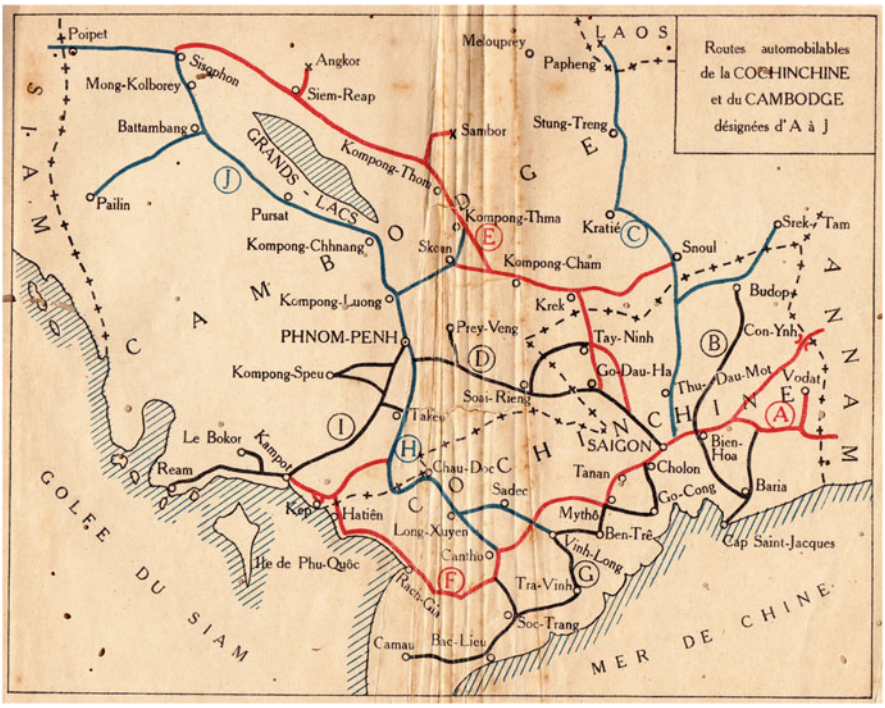

Fig. 13 Angkor (see upper left part of the map) established in a dense sight-seeing network of motorways between Cambodia and the Cochinchine in Nores' *Itineraires automobiles en Indochine* (1930) (Source: Nores 1930, map)

guide completely reframed the tourist's time management plan and visiting behaviour, confessing that in order to appreciate the charm and particularities of each of the (now!) year-round accessible temples, one week was the perfect time scale for an Angkor visit with a selected visit of two or three temples maximum per day. Now the choice of temple sites had become too large. To quote Glaize: "Do not have the pretention to see them all" (Glaize 1948, v). As a consequence, he introduced eight so-called itineraries ("itinéraire-types"), which included indications of the circulation distances in kilometres for the stressed tourist. The itineraries ranged from only one morning or one afternoon stays to one to five and more than five-day programmes with an incredible average radius of thirty kilometres per day (maximum seventy kilometers), including sunrise and sunset spots, full moon watching, dance performances inside Angkor Wat (Falser 2013), and elephant rides up the hill temple. Interestingly enough, even in the one-week tour plan to out-of-circuit temples ("hors-circuit") not a single comment was made about the local population, village, and pagoda activities. Glaize introduced a new guiding system for the larger archaeological sites being indicated by a dotted line on the folding plans. His introductory statement for an unstressed viewing of the specific charms of each temple did not necessarily include individual discovery by chance since everything was mapped out

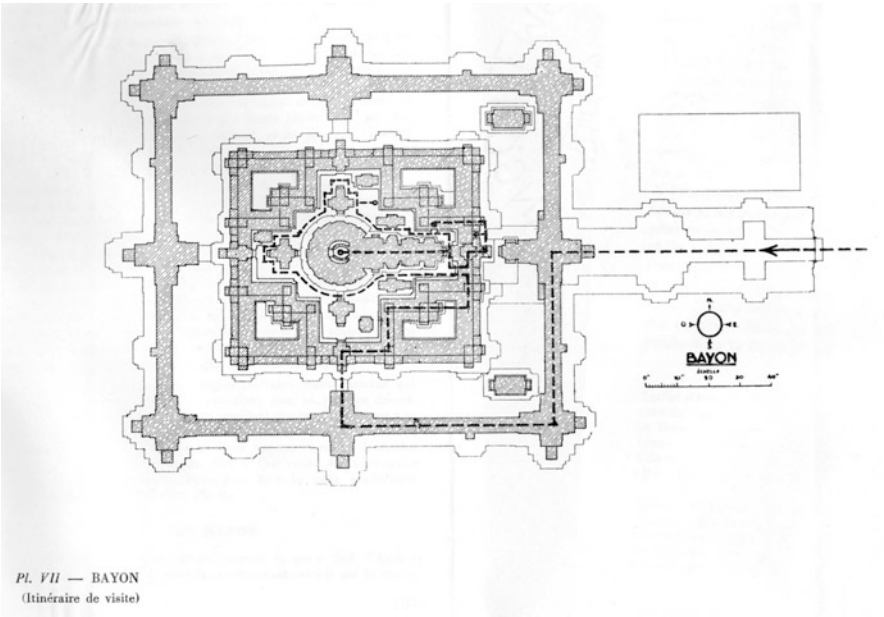

Fig. 14 A new tourist guiding system (*itineraire*) by dotted lines on the temples' floor plans in Maurice Glaize's *Les monuments du groupe d'Angkor* of 1944 (Source: Glaize 1948, 108)

by the guidebook (Fig. 14). To follow up on the long-established colonial tradition of appropriative cataloguing and comparative listing of cultural heritage, Glaize added illustrative charts on the development of lintel decoration styles to his tabled chronology of the kings of Angkor.[27] The last guide in the line was published by the EFEO chief archaeologist Henri Parmentier in 1950 (republished in 1960), which focused more on building and ornamentation styles and was less useful as a practical guidebook; nevertheless, the folkloristic touch of the cover of his book left no doubt about its purpose for use in the fast growing tourist industry (Fig. 15).

Final Remarks

It seemed that everything about the archaeological heritage of the Angkor temples has been said, from the smallest details of the bas-reliefs of Angkor Wat and circulation plans, to the placement of the Angkor region in an increasingly detailed network of tourist sites all over Indochina, which have lately (accelerated by the

[27] This comparative styling system that had been introduced in the late 1920s by an art historian from the Parisian Musée Guimet, Philipppe Stern and his student, Gilberte de Coral-Remusat on the basis of photographs without even going to the temples themselves (Stern, Philippe. 1927. *Le Bayon d'Angkor et l'évolution de l'art Khmer*. Paris: P. Geuthner, and de Coral-Remusat, Gilberte. 1940. *L'art khmèr, les grandes étappes de son evolution*. Paris: Les Éditions d'art et d'histoire).

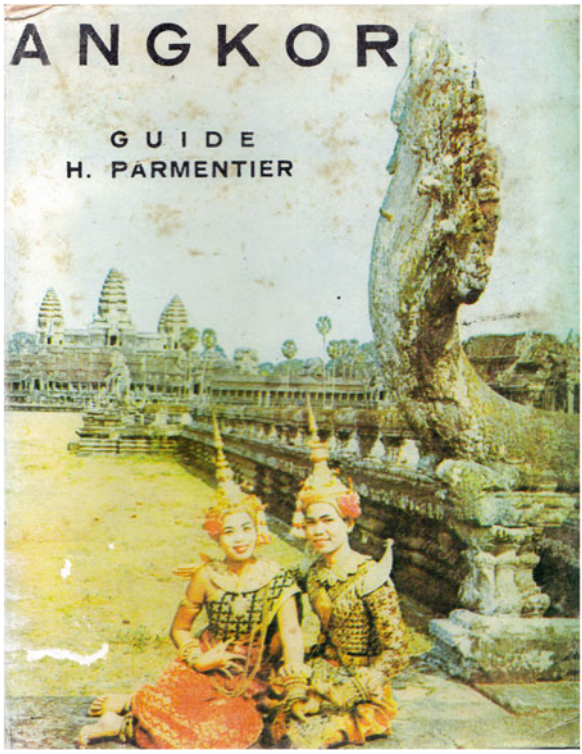

Fig. 15 The cover of *Angkor. Guide Henri Parmentier* of 1960 with Khmer dancers next to the central causeway of Angkor Wat (Source: Parmentier 1960, cover)

updated versions of these guides after Cambodian independence in 1953) included wildlife hunting and beach hopping. All sorts of time and space ordering features were introduced for the Angkor park: the pre-directed visitors' movement, the time budget, and preselected visual perspectives, and the classified and hierarchized heritage material. It became a perfect example of colonial "time-space compression" (Harvey 1989) of cultural heritage and guidebooks of early mass tourism.

To sum up: by the circulating tourist guide books,[28] the area of the Angkor temples was aesthetically and physically converted from a lightly populated but nevertheless lively place of local worship that formed a part of the daily lives of its inhabitants, into a dead heritage park of colonial archaeology, suitable for the fast-growing and even globalizing tourism that came to an abrupt and dramatic end with the civil war after the *coup d'etat* against Norodom Sihanouk in 1970, the Khmer Rouge terror between 1975 and 1979, and the Vietnamese occupation of Cambodia until 1989. However, he who believes that the perceptive scale of Angkor's archaeological heritage and the techniques of its visualization has come to an end, has not considered the events of the globalizing 1990s when the so-called *Archaeological Park of Angkor* was nominated in 1992 as a UNESCO World Heritage Site within the same core zone designated seventy years earlier. Whether satellite images

[28] Tourist guide books count as another sort of "prescriptive colonial texts", compare Sengupta's contribution in this volume.

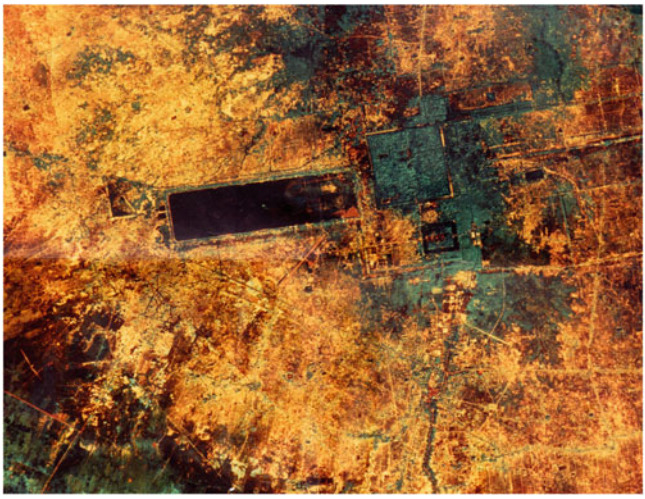

Fig. 16 Satellite image of the zone of Angkor, introduced for the *Zoning and Environmental Management Plan for Angkor (ZEMP)* around 1993 (Source: *Zoning and Environmental Management Plan for Angkor*. Executive Summary, prepared by ZEMP expert team, Sept. 1993 (UNESCO Archives Phnom Penh))

(Fig. 16) or virtual 3D-temple images will help us to finally understand the intertwined physical *and* social complexity of Angkor seems doubtful.[29]

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[29] Compare the different sections on the virtual models in this volume.

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Part III
Virtualizing Heritage I: The Surface and the Image

Reality-Based Virtual Models in Cultural Heritage

Armin Gruen

Abstract With digital globes like Google Earth or Microsoft Bing Maps the access to virtual, geo-referenced 3D data has become considerably easier and these sources of information are now frequently used by a worldwide audience. The underlying technologies in sensors and data processing have strongly influenced many disciplines and have led in many cases to completely novel as to how the work is conducted, with new possibilities for improved data acquisition, processing, analysis, representation, and dissemination. Archaeology and cultural heritage are definitely among those fields that have drawn many advantages from this situation. Advanced 3D modelling of landscapes, sites, single architectures, statues, findings, and artefacts have given the experts in the field and office new tools for better analysis and interpretation of processes, developments, and relations.

This article, after a brief review of the currently available sensor technology and an introduction to the photogrammetric data acquisition and processing procedures, will show how this technology works and what kind of products can be generated. We will touch upon the use of satellite, aerial, and terrestrial images, but also address laser scanning and structured light systems. The use of different imaging sensors in the case of the recording of large sites will be shown, presenting results from our Bamiyan, Afghanistan project. With our Tucume, Peru project we will demonstrate how we can go back in time using image-based techniques. With different examples of terrestrial applications we emphasize the wide variety of available sensors and applications.

Keywords Reality-based virtual model • Cultural heritage • 3D modelling • Archaeology • Scientific computing

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Introduction

Surveying techniques have been used since the nineteenth century for the recording and documentation of archaeological and cultural heritage sites and objects. Most often a combination of traditional surveying and photogrammetry methods have been applied to solve problems.[1] In photogrammetry, for example, the first large-scale applications were in what was then called architectural photogrammetry. Until 1970 architectural photogrammetry was still largely executed using analogue techniques, with the results being graphical products (plans, maps) even though analytical methods and instruments were already then available. Since then, photogrammetric recording and processing techniques have undergone major changes and other technologies like laser scanning, structured light, GPS, INS, etc. are being used as well. With the emergence of digital technologies traditional applications experienced a revival and new fields of applications have opened up (Gruen 1994).

The full digitization of the data acquisition and processing chain has led to a tremendous boom in cultural heritage applications. The recording, processing, modelling, analysis, archiving, and representation of cultural heritage items span the whole spectrum from recording small archaeological findings and statues, monitoring of archaeological sites, modelling of single buildings, ensembles, and town sections, up to full-scale 3D city models. Since UNESCO has also included large cultural heritage sites and landscapes on the World Heritage List, these objects are now also the subjects of photogrammetric attention. The geometric information generated by photogrammetry and other techniques is amended by texture information (appearance) and semantics, sometimes coming from already existing databases, publications, archaeological excavations, and records, etc. The resulting models are subjected to simulations and animations of all sorts. We call this process of model generation 'reality-based modelling', because a real world object is measured, modelled, and visualized. A 3D model is the computer representation of the object in 3D space. In addition, 4D models include information about changes of the object over time (with time being the fourth dimension), moving objects, or dynamic processes.

Buildings and sites can be populated by virtual actors (avatars), who can act and interact by moving, speaking, and other human expressions. This opens up great possibilities for education, training, and entertainment. The term 'edutainment' accurately expresses the opportunities that arise from these technologies. Virtual museums, emerging lately in many places, are good examples of this.

All this development is clearly technology driven. What are the technologies that have triggered such tremendous progress now? In reality-based recording and modelling we can distinguish the following components in data handling: acquisition, processing, administration, analysis, and representation.

This contribution aims to demonstrate how the digitization and virtualization of archaeology and cultural heritage can take advantage of some of the latest

[1] Editor's note: Compare the contribution by Weiler in this volume on the role of photography in colonial archaeology and restoration.

technologies. We will limit ourselves to image-based techniques.[2] That is, we will look at procedures which are capable of turning images into 3D or even 4D models and can also record dynamic processes (Gruen 2008).

Images may come from a wide range of different sensors and platforms. Earth observing satellite platforms carry increasingly high-resolution imaging sensors with stereo capabilities. Digital aerial cameras of various types collect images at an unprecedented speed and number. Still video cameras and camcorders are nowadays available in great numbers and can, after calibration, also be used for photogrammetric purposes. Infrared and microwave images have found increased applications in recent years. Photogrammetry and remote sensing are defined as image-based modelling techniques that allow for the extraction of both geometric and semantic information from images. Efficient (accurate, reliable, and fast) processes of transforming raw image data into value-added 3D model information are currently of utmost importance for the creation of geospatial databases.

On the technology side we now have at our disposal a vast array of relevant and efficient data acquisition tools: High-resolution satellite images; large and medium format digital aerial cameras; hyperspectral sensors with several hundred channels; interferometric radar from space, aerial and, lately, even from terrestrial platforms; laser scanners of both aerial and terrestrial type, partially with integrated cameras; model helicopters and airplanes with off-the-shelf digital cameras; panoramic cameras and a large number of diverse customer-type still video cameras, camcorders, and even mobile phone cameras. This is augmented by structured light systems and GPS/IMU systems for precise navigation and positioning.

Automated and semi-automated algorithms allow us to process the data more efficiently than ever before and Spatial Information System technology provides for data administration, analysis, and other functions of interest. Finally, visualization and animation software is becoming affordable with better functionality. This sets the scene for a totally new evaluation of the tools and techniques for use in archaeology and cultural heritage recording and modelling. In this article we will briefly describe the 3D modelling approaches in use for the Bamiyan and the Tucume projects (with the use of satellite and aerial images) and the project 'Weary Herakles,' demonstrating the use of terrestrial sensor systems.

[2] Editor's note: These strictly *surface*-oriented virtual models stand in concurrence of structural models which are generated on the basis of detailed material and building research and archaeology on site (compare Toubekis/Jansen in this volume) and generic renderings to explore chronological developments of an architectural site through different periods of time (compare Cunin). A surface-oriented rendering through photographical documentation is to a certain extent comparable to the older technique of plaster casting where selected decorative surfaces of architectural ensembles were copied, transferred, and inserted into new substitutive models of the 'real site' (compare the contribution by Baptiste in this volume). Nguonphan/Bock present another option in this volume where decorative details of Angkorian temple structures are surveyed and converted into digital elements in order to reconstitute the whole temple structure on the basis of its decorative system.

Products and Main Applications

Currently there are four types of products in which spatially-related 3D modelling is of particular importance: Digital terrain (surface) models; 3D city and site models; cultural and natural heritage models; special models (for forest/vegetation, water, etc).

The importance of terrain and city models is obvious. They form the basis for any geo-related studies and developments in our natural and manmade environments.

In heritage applications we distinguish four areas, for which model generation is essential: Larger sites and ensembles; single structures and buildings; statues and other objects; artefacts and smaller findings.

The modelling of large sites has received much attention in recent years. This was triggered on the one side by the increased interest of UNESCO and other supranational and national organizations, and on the other side by the new technologies available for recording, processing, administration, and visualization of the data. In the past we have conducted a number of projects that have shown the potential of some of the new recording, processing, and modelling techniques.[3] Among those are:

Large sites: Mount Everest (Gruen and Murai 2002); Ayers Rock/Australia, Kunming Region/China (Zhang et al. 2002); Bamiyan/Afghanistan (Gruen et al. 2004a, 2004b); Geoglyphs of Nasca/Peru (Lambers and Gruen 2003; Reindel and Gruen 2005); Tucume/Peru (Sauerbier et al. 2004); Inca settlement Pinchango Alto/Peru (Eisenbeiss et al. 2005); Machu Picchu/Peru (in progress); Petroglyph site of Chichictara/Peru (Sauerbier et al. 2004); Xochicalco/Mexico (Gruen and Wang 2002).

Single structures/buildings: Rock church Bet Georgis of Lalibela/Ethiopia (Buehrer et al. 2001); Bayon Tower, Angkor/Cambodia (Visnovcova et al. 2001); Castle Landenberg/Switzerland (Pueschel et al. 2008).

Statues and other objects: 'Weary Herakles,' Antalya Museum/Turkey; Khmer Head, Rietberg Museum Zurich/Switzerland (Akça et al. 2007); Pfyffer Relief, Luzern/Switzerland. For statue-type objects and smaller items we have had success in the use of active (especially structured light) optical systems (Akça et al. 2007). Virtual museums are major users of these techniques.

3D computer models may serve a multitude of purposes today:

Documentation: Almost all cultural heritage objects are subject to change over time. In the worst case this may be the result of continuous decay or even destruction. Therefore it is of fundamental interest to record those objects for the sake of future generations.

Conservation, restoration, reconstruction: Digital data is essential for the application of modern and efficient techniques in these fields.[4]

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[3] For a comprehensive list of these projects consult the webpage. www.igp.ethz.ch/photogrammetry/research/projects. Accessed 25 July, 2011.

[4] Editor's note: A concrete case of the application of virtual models for restoration strategies on site is discussed by Sanday in this volume. Cunin's contribution, however, does not necessarily focus on restoration measures per se but on the theoretical establishing of buildings chronologies and typologies.

Site and object management: Modern management methods require the use of computer-based methods and thus digital data, among those are also 3D models.

Environmental monitoring: Large sites are often particularly subject to severe natural and human impacts. Digital data, especially 3D models, are today indispensable for effective monitoring.

Scientific analysis and queries: With digital models and spatial information systems various tasks of analysis (hypothesis testing, time-based analysis, geometric comparisons, etc.) can be executed much more efficiently and in a holistic way.

Scientific visualization. This is usually part of the analysis procedure. With advanced visualization techniques very often the unseen and inaccessible can be made visible.

Dissemination of information, teaching, info- and edutainment: Digital technologies and models are the modern basis for these tasks. Virtual museums and Internet-based communication are very popular manifestations.[5]

Feeding tourist interest: Worldwide digital globes like Google Earth now play a key role in information gathering for tourism activities. Sooner or later 3D models of cultural heritage objects will also be presented there.

Algorithmic and procedural developments: This is aimed at the producer of models who constantly tries to improve his/her own techniques of data recording and processing.

Ideally and very soon 3D models will serve more than one of these purposes simultaneously. This is definitely the case with our previously mentioned projects.

Object Recording and Modelling of Cultural Heritage

In photogrammetric recording and modelling, we can distinguish the following components in data handling: Acquisition, processing, administration, analysis, and representation. Figure 1 shows the data and information-processing pipeline, as it is usually used in order to turn images into models.

Data acquisition: While previously we only had one type of sensor available—the photographic camera—now we make use of a large variety of different devices: from camcorders, linear array cameras of various types (among those three-line scanners and panoramic cameras) laser scanners, X-ray and electronic imaging devices to videotheodolites, etc. Several aspects have led to new concepts in data acquisition: The ease of image taking, the possibilities for fast image processing, and the need for real texture mapping. While traditionally the art of photogrammetry consisted in taking and processing as few images as possible, very often from a fixed stereo base, we are now experiencing a paradigm shift towards the collection of large numbers of images (image sequences) taken from all possible directions in order to facilitate automated processing and good photo-realistic texture mapping.

[5] Editor's note: Contributions of Nguonphan, Cunin, and Chermayeff in this volume discuss the application of virtual models of archaeological sites in the edutainment sector.

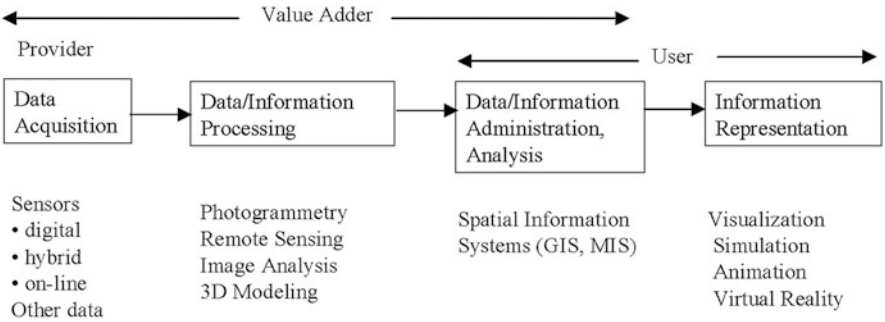

Fig. 1 Data and information pipeline, as used in photogrammetry and remote sensing (Grün)

Data processing: The increased power of computers and the availability of application software allows for much faster processing of the data and for new kinds of products. Also, with digital photogrammetry the costs of systems are drastically reduced. The automation of processing is the key topic in research and development today. One can observe very often that results generated by automated methods do not match the requirements of the user of cultural heritage data by far.

Data administration and analysis: The use of spatial information systems (SIS) has opened new venues for storage and administration, but also for the analysis of data. The database functions of SIS allow for the storage of consistent, non-redundant data, both for geometric and attribute information. This way up-to-date vector and raster data can be combined with information from archaeological records.

Data representation: Traditionally the results of processing were presented as graphic plots (maps and plans) or in form of lists and tables. Now 3D visualization products are standard. A large amount of commercial software is available for this purpose, but in most cases with severe limitations. The key parameters to be observed here are true 3D modelling, real-time capability, quality of rendering, and size of datasets. Beyond pure visualization, techniques from virtual reality, augmented reality, simulation, and animation are also very useful for cultural heritage applications.

Photogrammetry and remote sensing are image-based techniques for the extraction of metric and semantic information from images. Originally terrestrial photogrammetry, aerial photogrammetry, and satellite remote sensing developed along separate lines, both in terms of the types of sensors used and in the processing methodology and tools. Today, within an almost completely digital environment, we can see a strong trend towards convergence.

Some Key Issues in 3D Modelling

A crucial point is the cooperation between the customer (archaeologist, art historian, cultural heritage expert, etc.) and the producer. For an optimal product this cooperation is absolutely essential from the very beginning of the project.

The project specifications in terms of model extension, geometrical and texture resolution, model accuracy, form of representation, animation, dissemination, project costs, etc. must be discussed in great detail. Unrealistic expectations must be avoided at the early stages of the project. The customer must clearly understand what purpose the model should serve and who his/her audience is.

Reality-based models are generated through several stages of interpretation of the real world through various sensors and human operators. This filtering process and its consequences must be clearly understood by all parties. The producer must establish a quality control procedure that gives the customer a reliable indication of the metric and semantic quality of the model. Also, any digital product can be easily manipulated. Access to the model must be restricted to knowledgeable and trustworthy personnel. The 'beautification' of models should be handled with care and should always serve the purpose.

Relevant satellite imaging sensors and new aerial digital cameras: The development and increased availability of high-resolution, multi-spectral and stereo-capable satellite sensors, and of a new generation of digital, large format aerial cameras is crucial for the efficient modelling of large sites. From satellite platforms there are a large variety of image products available in terms of geometrical resolution (footprint), spectral resolution (number of spectral channels), and costs. All images are acquired with digital sensors, using Linear Array CCD camera technology. For precise processing this requires a particular sensor model and the related special software. The availability of images and their costs can be checked through a number of image providers over the Internet. Nowadays aerial photogrammetry is also going fully digital. Large format digital aerial cameras have been offered by a number of manufacturers since 2000 and these cameras have already found their way into many projects. We have actually witnessed the worldwide replacement of the traditional film-based aerial cameras with this new generation of digital cameras.

New methods for digital photogrammetric processing: The new generation of sensors has a number of particular properties that require new approaches in processing if the inherent accuracy and data processing potentials can be used. Data processing can be done in three modes: manually, semi-automatically, and fully automatically. 'Manual' means that a human operator effects the image interpretation and measurements. 'Full automation' is attractive because the results can be obtained very quickly and large amounts of data can be processed in a short time. The automation of photogrammetric processing is obviously an important factor when it comes to efficiency and costs of data processing. The success of automation in image analysis depends on many factors and is currently a hot topic in the research of virtual modelling technology. Progress is slow and the acceptance of results depends on the quality specifications of the user. Also, the image scale plays an important role in automation. Potentially, the smaller the scale the more successful automation will be.

For the 3D modelling of buildings and other manmade objects we have developed and tested a methodology called CyberCity Modeler (CC-Modeler). This is a semi-automated technique where the operator measures a weakly structured point

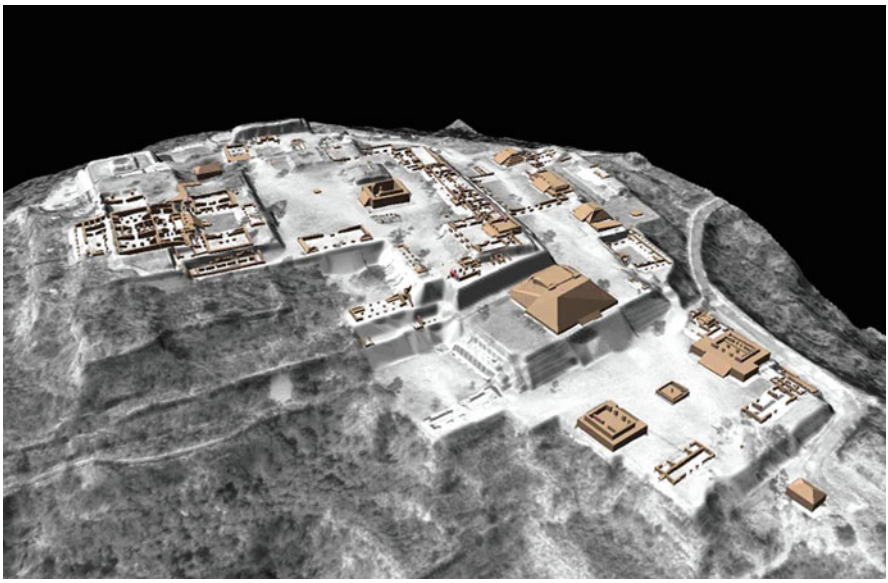

Fig. 2 Partially textured 3D model of Xochicalco, derived semi-automatically from a stereo pair of aerial images using CyberCity Modeler (Grün)

cloud, which describes the key points of an object, manually in the stereo model. The software then automatically turns this point cloud into a structured 3D model, which is compatible with CAD, visualization, and GIS software. Texture can be added to the geometry to generate a hybrid model. An example using CyberCity Modeler for 3D modelling of terrain and buildings in an archaeological application was conducted for the pre-Hispanic site of Xochicalco in Mexico, where an urban centre was reconstructed from two aerial images (Gruen and Wang 2002) (Fig. 2).

On the other hand, if an object is of relatively low geometrical complexity (with a largely continuous surface), then automated image matching (with possibly some post-editing) may lead to satisfying results for surface representation.

Automated model generation in close-range photogrammetry: Fully automated model generation from images is a difficult and basically still unsolved problem. Image matching is generally defined as the establishment of correspondences between two or more images to reconstruct surfaces in 3D. This corresponds to the human task of visual stereo measurements from two (stereo) images (Remondino and Niederoest 2004). Figure 3a–d shows some examples of automated image matching.

Object scanning with structured light systems: A structured light system is an active stereovision device, using the principle of optical triangulation. The key feature of the system is the replacement of one of the two cameras of a stereo system with an active light source, which illuminates the object with a known

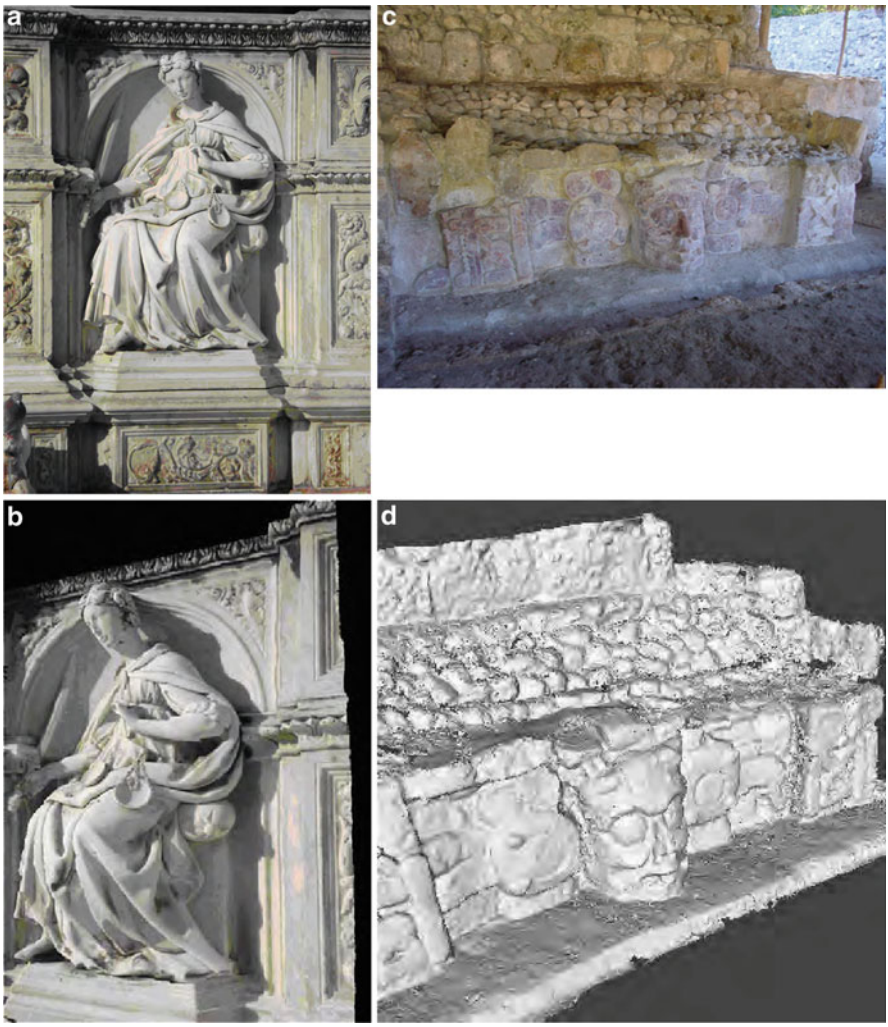

Fig. 3 (**a–d**). Typical cultural heritage objects requiring detailed and accurate 3D models for documentation, conservation, analysis, restoration, or manufacturing of replicas. *Upper row*: Images; *lower row*: 3D models, generated automatically by image matching (Source: Remondino et al. 2008)

pattern. A digital camera records the image of the object together with the projected pattern. This solves the correspondence problem in a direct way.

Topometrical high definition 3D scanners, optimized for the requirements of arts and cultural heritage, allow the 3D digitization of art objects and paintings with high resolution and accuracy. Also, the texture and/or colour of the object can be recorded, offering a one-to-one correspondence of 3D coordinates and colour information.

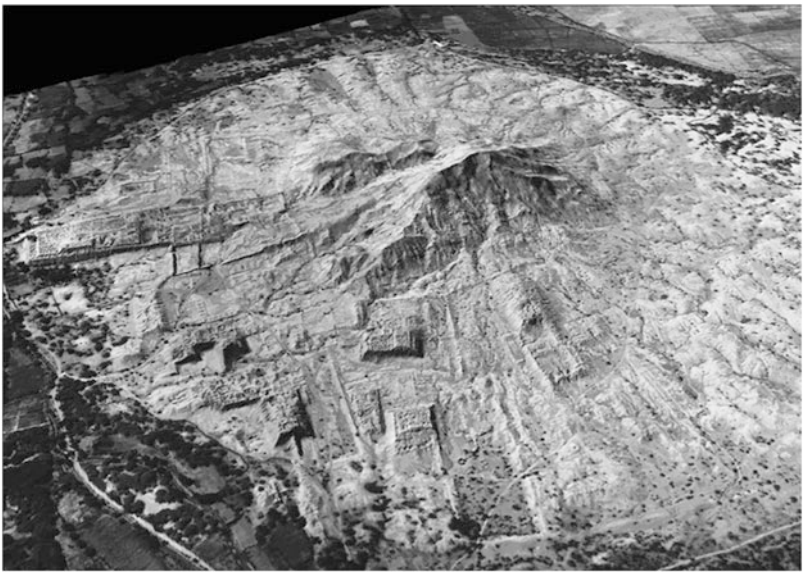

Fig. 4 View of the 3D model of the Tucume adobe complex, produced with Skyline Terra Explorer Pro. Overlaid is the texture from 1949 aerial images. To the left is Huaca Larga, a huge adobe building of 545 m base length, with an Inca stone building on top (Grün)

Terrain modelling—natural heritage site generation: The terrain is a key element in all geo-related applications and investigations. Therefore 3D modelling of terrain is an ever-relevant issue. The status of terrain modelling varies very much worldwide. Although various worldwide digital surface models (DSMs) already exist, these show the terrain only in 2.5D representation, have many gaps, and are partially very inaccurate. The need for more detailed modelling is clear in many of the applications and mapping efforts that are underway in many countries. In larger projects satellite stereo images are combined with aerial images in order to generate new DSMs over vast areas.

Such efforts can only be successful if the required data can be generated in an automated or at least a semi-automated way. Although image matching has a long history of research and development, the problem is not yet fully solved. Sometimes DSMs may be derived from already existing analogue images and maps (Gruen and Murai 2002). Certain studies may require the analysis of changes occurring over time. Image-based techniques allow us to go back in time, by processing existing older images. This has been done with the archaeological site of Tucume in Peru, where a 3D model was produced from aerial images taken in 1949 (Fig. 4). Sometimes images from different platforms, sensors, and times may have to be combined in 3D modelling, like in the case of our Bamiyan project in Afghanistan (Gruen et al. 2004a, 2004b; Gruen and Hanusch 2008).

UAV photogrammetry: UAVs (unmanned aerial vehicles) are a relatively new breed of platforms, which are ideally suited for archaeological and cultural heritage

modelling. They are small, lightweight, very flexible in operation, relatively inexpensive, and most suitable to record relatively small areas. They are usually model helicopters or model fixed wing airplanes, but increasingly quadrocopters and octocopters are also being used. This technology has received a lot of attention lately. We only briefly address the modelling of the Castle Landenberg, Switzerland, which was based purely on a sequence of UAV images (For more details see Pueschel et al. 2008).

Visualization of 3D models: Visualization of 3D models is an essential function. A model that cannot be seen at all or that can only be seen with a long time delay loses much of its value. Software packages for terrain visualization are abundantly available, both in the commercial and scientific domains. Although the conceptional aspects of computer graphics algorithms are quite straightforward, it is always the implementation and the quality of the key components of the computer platform that define the performance. Geo-visualization packages are complex software systems with strong dependencies on the hardware as well. In order to represent an efficient system all components have to perform well individually, but their interaction must also be solved in an acceptable manner. When analysing visualization software a major consideration is whether interactive or even real-time performance is required or not: Real-time performance is intriguing enough that most users, once they have been exposed to it, do not want to do without it. Also, for many analysis applications, real-time performance is a must for the sake of economy and efficiency of operation.

Examples

In recent years we have modelled a number of large natural and cultural heritage sites. In the following we will report on the results and experiences gained through the projects Tucume and Bamiyan (see above). We will also demonstrate a typical example of terrestrial sensor application—a structured light system, modelling the "Weary Herakles" statue from the Antalya Museum in Turkey (Akça et al. 2007).

Tucume, Peru: 3D Reconstruction of Adobe Architecture Using Old Images

In the region of Tucume in northern Peru, in the department of Lambayeque, the so-called pyramids of Tucume represent a unique example of adobe architecture built during different periods of pre-Hispanic cultures. Most of the buildings were constructed during the Late Intermediate Period (1000–1400 CE) and later also used by the Incas until the arrival of the Spaniards in 1532. From the Cerro La Raya, a characteristic hill in the centre of the site, twenty-six adobe buildings are visible, the largest one, Huaca Larga, with a base length of 545 m, 110 m in width and 21 m in height. As the adobe structures are heavily affected by wind erosion and the

occasional El Niño rains, the architecture should be modelled as well as possible in an unaffected state. For this reason, aerial imagery from the years 1949 and 1983 were acquired from the Peruvian SAN (Servicio Aerofotográfico Nacional, Lima), which show the adobe complex in two different states. As no control points existed for the 1949 images, two maps and the 1983 imagery had to be used for the orientation. The orientation of the 1983 images was accomplished on an analytical plotter WILD S9, while for the orientation of the 1949 images both the analytical plotter and a digital photogrammetric workstation Virtuozo 3.1 were used. The photogrammetric products derived from the oriented 1949 images are a manually measured DTM, an automatically generated DSM, an orthomosaic and a photorealistic 3D model (Sauerbier et al. 2004). The hybrid model was visualized using the software packages Skyline Terra Builder/Explorer Pro (Fig. 4) and ERDAS Imagine Virtual GIS. The 3D model can now serve archaeologists and other scientists as a means of documentation, analysis, and presentation of the cultural heritage site of Tucume in a state of preservation from 1949.

Bamiyan, Afghanistan: 3D Modelling of Natural and Cultural Heritage with Multiple Sensors

The Bamiyan region, situated about 200 km northwest of Kabul in Afghanistan, is one of the most famous Buddhist monument sites in the world. Global attention was drawn to Bamiyan when the Taliban regime destroyed the big standing Buddha statues in March 2001. Our main goals for the Bamiyan project were:

- Terrain modelling of the entire Bamiyan area from satellite images for the generation of virtual flights over the UNESCO cultural heritage site.
- Modelling of the rock cliff from which the Buddhas were carved.
- 3D computer reconstruction of the two lost Buddha statues and the re-mapping of the frescos in the niches.
- 3D modelling of the two empty niches where the Buddha statues once stood.
- Documentation of the cultural heritage area with a topographic, tourist, and cultural information system.

The project is an excellent example of image-based modelling, using many types of images with different spatial resolutions. It shows the capabilities and achievements of the photogrammetric modelling techniques and combines large site landscape modelling with highly detailed modelling of objects with terrestrial images.[6]

[6] Editor's note: It is interesting to compare Gruen's virtual models of the Bamiyan Buddhas from the perspective of image- and surface-based technology for the great public attention and effect with the same case study in the contribution of Toubekis/Jansen in which the renderings of the Bamiyan Buddhas serve as a basis of applied building archaeology and structural restoration work. In both cases, the images have a suggestive quality for the addressed customers. The interpretation of the results, however, highly depends on the background knowledge of the spectators.

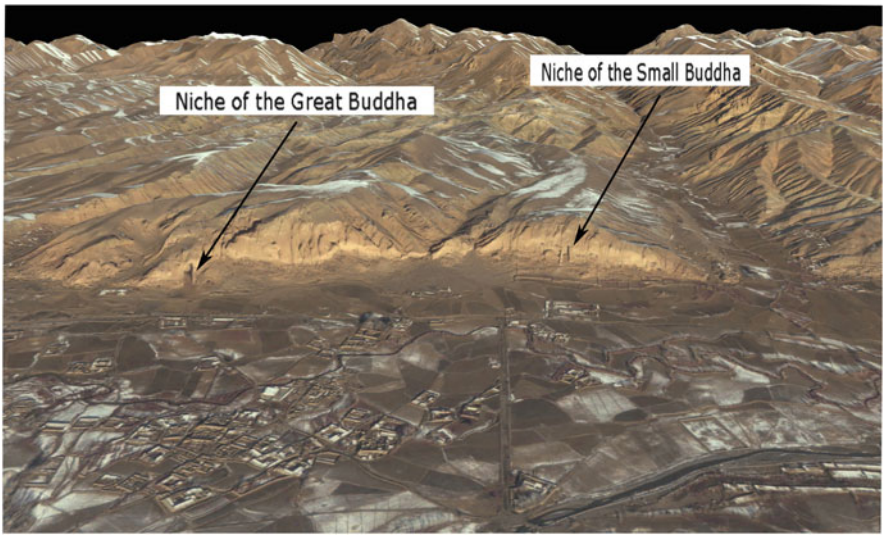

Fig. 5 View of the 3D hybrid terrain model of Bamiyan, textured with an IKONOS ortho-image mosaic, showing the rock cliff with the now empty niches of the Buddhas (Grün)

Photogrammetric processing was used by our group for different purposes: 3D reconstruction of the Great Buddha statue (Gruen et al. 2004a) and the Small Buddha statue (Gruen and Hanusch 2008); 3D modelling of the rock façade (Gruen et al. 2006); and generation of a high-resolution mosaic of the destroyed fresco in the Great Buddha's niche (Remondino and Niederoest 2004), all from terrestrial close-range images (old metric photographs, Internet images, semi-metric images, still video images, and small and medium format tourist photographs), and the generation of a digital terrain model of the Bamiyan valley and its surroundings from SPOT-5 and IKONOS satellite imagery using SAT-PP (Gruen et al. 2004b). For the reconstruction and modelling of the Bamiyan cliff, a series of terrestrial images acquired with an analogue Rollei 6006 camera was used. The images were digitized at twenty-micrometer resolution and then oriented with a photogrammetric bundle adjustment. Then manual measurements were performed on stereo pairs in order to get all the small details that an automated procedure would smooth out. The recovered point cloud was triangulated, edited, and finally textured (Fig. 5).

The 3D computer reconstruction of the Great Buddha statue was performed with different image datasets and using different algorithms (Gruen et al. 2004a). Various 3D computer models of different quality, mostly based on automated image measurements, were produced. However, in most of the cases, the reconstructed 3D model did not contain essential small features, like the folds of the dress and some important edges of the niche. Therefore, for the generation of a complete and detailed 3D model, manual photogrammetric measurements were indispensable. They were performed along horizontal profiles at twenty centimetre

Fig. 6 Textured models of the Great Buddha of Bamiyan (*right*) and its currently empty niche (*left*) (Grün)

Fig. 7 Textured model of the Small Buddha of Bamiyan, as reconstructed from two tourist-type, medium format photographs (Grün)

intervals on three metric images, acquired in 1970 by Robert Kostka and scanned in high resolution. The final 3D model of the Great Buddha was used for the generation of different physical models. The modelling of the empty Buddha niches was performed using five digital images for each niche, acquired with a Sony Cybershot F707 during our field campaign in August 2003. After the image orientation, three stereo models were set up and points were manually measured along horizontal profiles, while the main edges were measured as break lines. Thus a point cloud of about 12,000 points was generated for the Great Buddha niche. The final textured 3D model is displayed in Fig. 6.

The Small Buddha was modelled using two photographs that were taken in 1975 by a tourist and which depicted the statue before demolition. These tourist type photos were acquired using a 5.5×5.5 cm^2 analogue YASHICA frame camera with a focal length of around 80 mm. This was combined with surface information from a digitized contour map (published in Higuchi 2001), and generated by using metric images of a photogrammetric campaign, which are not available to the public. The textured model of the Small Buddha is shown in Fig. 7. The model is incomplete along the feet of the statue because they were not imaged in the original photographs.

The 'Weary Herakles,' Antalya, Turkey: Object Scanning with Structured Light Systems

The 'Weary Herakles' is a marble Herakles statue dating to the second century AD. The lower part is on display in the Antalya Museum in Turkey (Fig. 8a–c), the upper half is currently preserved at the Boston Museum of Fine Arts (MFA).

Since both parts are separated geographically, our aim was to record and model both the lower and the upper part and bring these partial models together in the computer, so that the complete statue could be seen, appreciated, and analysed. The digitization of the lower part of the statue was realized in the Antalya Museum using a Breuckmann optoTOP-HE structured light system, but access to the Boston Museum piece was denied. The scanning campaign was completed after one and a half days of work. The statue is around 1.1 m in height. The whole object was covered with twenty six scans on the first day. The remaining eleven scans of the second day were for filling the data holes and occlusion areas. In total 83.75 million points were acquired in sixty six scan files. The pair-wise co-registration of the point clouds was done by use of an in-house developed method, called Least Squares 3D Surface Matching (LS3D) followed by noise and data reduction and hole filling procedures. Images taken separately with a four megapixel CCD Leica Digilux 1 camera, were used for the texture mapping. The visualization of the final model was done with the IMView module of PolyWorks™ (InnovMetric Software Inc., version 9.0.2). The textured model was visualized with the viewer of the VCLab's Tool (Akça et al. 2007).

Fig. 8 (**a–c**) 'Weary Herakles' in the Antalya Museum, Turkey; *left*: photograph of statue; *middle*: frontal view of the *grey shaded* model; *right*: texture mapped model (Grün)

Conclusions

In the past few years reality-based modelling techniques like digital photogrammetry and remote sensing have opened up many new areas of application. With the recent expansion of photogrammetry's data acquisition tools (sensors) and processing techniques we have seen many more novel applications emerging. The generation of reality-based data for virtual environments, animation, video gaming, and the like constitutes a huge potential for future work. The pressing need for geo-related modelling of our 3D environment (3D city and terrain modelling) from aerial and high-resolution satellite images and laser scanners has already had and will continue to have a tremendous impact on archaeology and cultural heritage in the near future.

With the new generation of high-resolution satellite sensors with stereo capabilities the issue of 3D modelling is gaining much more prominence. Photogrammetric techniques are also becoming more important in satellite image applications.

We have shown here how high-resolution satellite, aerial, and terrestrial images can be used in order to generate hybrid 3D models for archaeological and natural and cultural heritage applications with photogrammetric techniques.

Among the many various projects we have conducted, we have reported here about the large sites of Xochicalco/Mexico, Tucume/Peru, and Bamiyan/Afghanistan, where aerial and satellite images were used as a primary data source. Active sensors like structured light systems are well suited for the recording of

smaller objects since they are represented by statues and excavation artefacts. They are largely independent of ambient light and are accurate, delivering results quickly and in a robust manner. Active sensing with coded structured light systems is a mature technology that allows high-resolution documentation of cultural heritage objects. Raw data acquisition with laser scanning in the form of point clouds is very fast, but heavy user interaction is needed in the editing steps, e.g. for filling the data holes, deleting blunders, etc. Texture mapping is another issue that is not fully supported by the existing software as yet.

All these presented technologies, together with spatial information systems, visualization, and animation software are still in a dynamic state of development, with even better application prospects for the near future. However, it must not be overlooked that a computer model is only one, sometimes inaccurate, always incomplete, expression of the reality. It can support and amend, but it will never replace the work of the experts and the visits of curious locals and tourists on site.

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3D Modelling of the Temples of Angkor Based on Religious Conceptions

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Abstract The highly detailed decorated ancient temples in Angkor are religious buildings dedicating mainly to god and god king. It has therefore been built based on a sophisticated conception related to religion and microcosm.

This paper introduces a computational approach and module-based architecture for the improvement of modelling complex three-dimensional geometry of ancient temples in Cambodia. The development of this method is based on empirical observation and structural analysis of the temple architecture, particularly the concept of the sacred lotus flower as the religious iconography behind the architecture. Mathematical models and algorithms have been developed for practical experiments. Finally, a software tool specifically designed for 3D modelling of Khmer temples will be presented.

Keywords 3D modelling • Scientific computing • Cultural heritage • Angkor Temple Generator • Angkor Wat

Introduction

The Angkor temples are religious buildings, dedicated to Buddhism or Hinduism. In both religions, one of the outstanding symbols of the universe and microcosm is the lotus flower. Lotus blossoms in Hinduism are regarded as divine symbols for the creation mythology. In Buddhism the lotus flower floats above the muddy waters of desire and attachment and represents purity of mind and body (Schreiner 2002). Lotus symbols are also attached to the Buddhist and Hindu divine design of

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mandala, which is the fundamental design principle for both religions' temple constructions (Bunce 2002).

Inspired by the theory and practices of the sacred lotus ideology the ancient Khmer temple architects skilfully transformed this concept into a unique work of art and an architectural element. A typical example is the temple towers, which form a closed-up lotus flower. On almost every temple element the architects illustrated the various physical properties and positions of the lotus flower and petals (Fig. 1a, b).

At first glance we recognize in each element a certain reuse of diverse lotus motifs. Looking closely we will see that each motif is unique in its composition and proportion. Our research shows that the lotus motifs can be geometrically identified as six types wherein each has its own architectural function following particular constrained structuring rules. 3D modelling of temple elements with such highly detailed objects using conventional computer aided design (CAD) methodologies is a very difficult task. Since each lotus component is unique in its proportion and structural function on any temple elements (basement, column, base and capital of a wall, colonnette, window grids, etc.), each temple element is unique as well. Thus, theoretically, they must be modelled individually. In practice these details are rather simplified down to their basic geometrical representation or primitives while valuable architectural information gets lost.

Our methodological contribution is an algorithmic approach in computational architecture that combines fields of historic architecture, computer science, and applied mathematics. The central core of this method is defining the six lotus motifs as individual construction modules, which can be handled under a constraint-structuring rule. Numeric descriptions of each ideal module are predefined and stored in an object library, which allows users to derive the required type and quantity as well as transform each module to meet the properties of the original object profile.

We will introduce a software tool that is specialized for the highly detailed 3D modelling and reconstruction of Angkor temples. The development of this programme is aimed at providing possibilities not only for reconstruction elements of an existing temple, but can also be used for experimental purposes in developing new Khmer temple design concepts based on ancient Khmer construction rules.

Related Works

The history of module-based architecture can be traced back to Vitruvius in the first century BC. His work was republished with comprehensive illustrations in the sixteenth century and provides a solid foundation and prototype for recent works relating to the refinement of architectural structure and modular construction (Evers 2006). The semantic description is of considerable advantage for the virtual reconstruction in the modern age. There are numerous great works reflecting on the essence of architecture and, at the same time, using it to develop abstract and ideal architectural models.

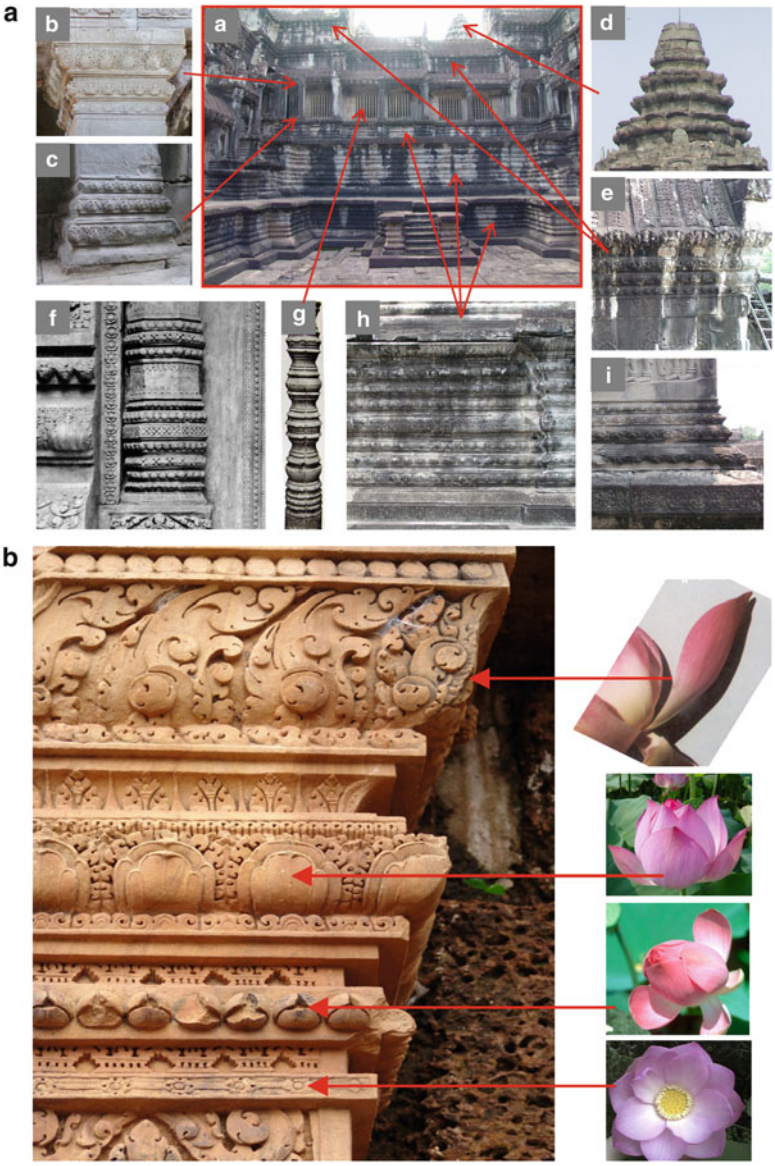

Fig. 1 (**a**) Lotus motifs as ornaments on Angkor Wat temple elements (**b**) Depiction of geometric forms of lotus flower from nature on to a column capital (Nguonphan, EFEO, Australian National University)

An architectural structure comprises elements of which the majority are recognizable as copies of one another or as belonging to a certain element family. This can be observed in modern architecture but also particularly in classical buildings. The characteristics of the lintel element of neoclassical building, for instance,

allows for classification into a finite number of types and 3D geometric descriptions, which provide a great advantage for the development of modelling tools (Chevrier et al. 2009), and which speed up the modelling process. Another considerable work concentrates on structural refinement of geometrically complex elements of classical buildings. Based on ancient architectural treaties, ten distinct 2D building blocks could be identified that can be used as modules to reconstruct several types of building elements (De Luca et al. 2007; von Mauch et al. 1998).

Similar methods have been experimented on the oriental architecture of Angkor in Cambodia (Fuchs 2006; Kadi 2004; compare in another architectural context Harmsen 2006). The case study here was the complex geometric structure of the decorative colonnettes of the Khmer temples. The highly detailed carvings, mainly depicting motifs of lotus flowers, are a huge challenge for computer reconstruction. Eleven different geometric forms are developed and parameterized as construction modules stored in an object library. Users can ultimately derive the required type quantity of modules, modify their parameters, and structure the components to meet the input data. Our proposed methodology is also a module-based reconstruction, but takes the original local conception for the architecture into account more. We go one step further towards automating the reconstruction process and at the same time improve the level of details of the 3D models.[1]

Methodology

Observations and structural analysis of a typical Khmer temple complex allow us to perform a three-step structural refinement as shown in Fig. 2. At the lowest level of refinement we obtain a large number of *single elements* comprising lotus motifs such as: the capital and base of wall and column, tower tiers, basement, crowning, colonnette, etc. Upon closer observation the implied lotus motifs allow us to geometrically categorize into six groups, and can be considered construction modules. Each module has specific architectural and structural functions. The quantity of each type, proportion, and structural ordering of the modules are factors in defining the temple element type.

[1] Editor's note: The technique of studying single original elements, establishing a kind of object library, and re-assembling the elements into generic temple reconstructions is related to Cunin's approach in this volume to establish building chronologies on the basis of structural analyses and the resulting digital models. In both approaches, the individuality of each single decorative or structural element is sacrificed for the generation of decorative of structural prototypes. To a certain extent, we might compare this virtual approach to the re-assembled plaster-cast hybrids of Angkor in a museum space in Paris as discussed in Baptiste's contribution. Other strategies follow the individuality of each structure and depict its overall texture on the basis of digital images (compare Toubekis/Jansen, Gruen, Sanday in this volume).

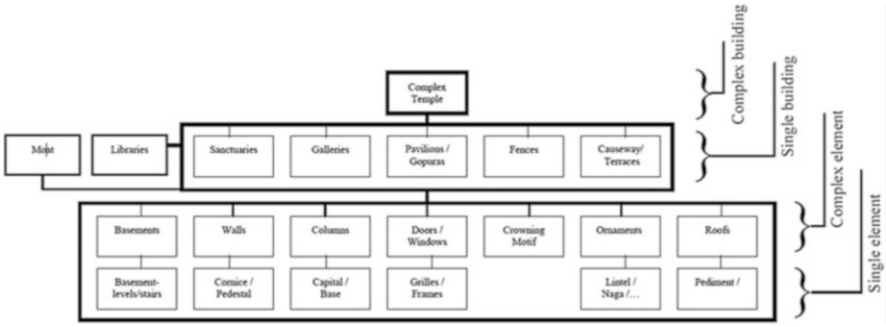

Fig. 2 Structural refinement of a typical temple complex (Source: Nguonphan 2009)

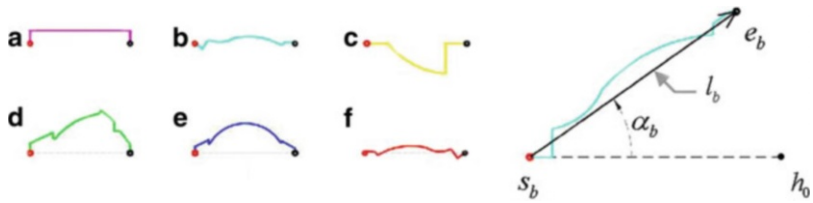

Fig. 3 Geometric representation of the six modules (lotus motifs) (Source: Nguonphan 2009)

Abstract Geometry and Combinatorial Constraints

The following terms are related mathematical modelling and logics relevant to describe the functionality behind the concept. The geometric representations of the modules are two-dimensional profiles of the lotus motifs in their ideal form as shown in Fig. 3. Let us define the six module types as *a*, *b*, *c*, *d*, *e*, and *f*. Each module has four additional properties, for instance, a module of type *b* has the following: start point (*sb*), end point (*eb*), length (*lb*), and rotation angle (*ab*). These properties are relevant for structuring the module sequence and their proportional settings; the two major steps of the reconstruction algorithm.

We first need to arrange the input module for an element profile construction in the proper order. Based on the individual architectural function of the modules a combinatorial constraint could be developed as shown in Fig. 4 (left image). Using this basic combine rule alone one is able to generate a proper sequence of module for any typical type of wall and column basement or *Lower Part Elements* (LPE) (Nguonphan 2009). Other types of elements are more advanced and need further restrictions in addition to the combinatorial rule. The right image of Fig. 4 presents an example for reconstruction of a profile of a column or wall basement *P*(*S1*) in which the module structure *S1* was generated using input data *N*(*S1*).

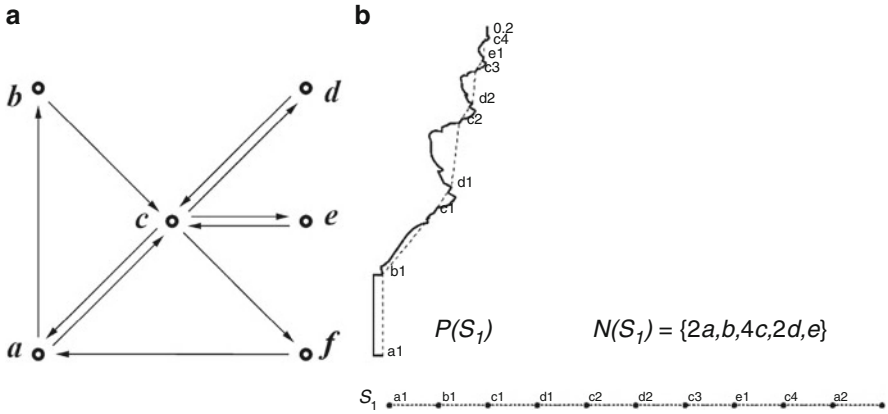

Fig. 4 (**a**–**b**) *Left*: Combinatorial constraint; *Right*: Sample for structuring a profile of column base *P*(*S1*) using input modules *N*(*S1*), and a generated module structure *S1* (Source: Nguonphan 2009)

Fig. 5 Adjacency matrix $\varphi(v_{jk})$ representing the combinatorial constraints (Source: Nguonphan 2009)

$$\varphi_{UPE}(v_{jk}) = \begin{pmatrix} v_{11} & \cdots & v_{16} \\ \vdots & \ddots & \vdots \\ v_{61} & \cdots & v_{66} \end{pmatrix} = \begin{array}{c} \\ a^j \\ b^j \\ c^j \\ e^j \\ d^j \\ f^j \end{array} \begin{array}{c} \begin{array}{cccccc} a^k & b^k & c^k & e^k & d^k & f^k \end{array} \\ \begin{pmatrix} 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \end{pmatrix} \end{array}$$

Algorithm

The graph of the combinatorial constraints must first be transformed into an adjacency matrix (Fig. 5), which allows us to have full control of both the related combinatorial properties of the modules (start point and end point) and conditions of the combine rule.

The essence of matrix is the following:

if $value\left[(\text{module type1})^j; (\text{module type2})^k\right] = 1$
then *module type1* is allowed to link with *module type2*
else *module type1* and *module type2* are not adjacent
with *j:* endpoint of *module type1; k:* start point of *module type2*

An example for reconstructing a module sequence of an ideal column basement profile is shown in Fig. 4. Using a given input data: $N(S) = \{2a, b, 4c, 2d, e\}$ the

i	1	2	3	4	5	6	7	8	9	10
t_i	${}_1a_1$	${}_1b_2$	${}_1c_3$	${}_1d_4$	${}_2c_5$	${}_2d_6$	${}_3c_7$	${}_1e_8$	${}_4c_9$	${}_2a_{10}$
current lookup row	1	2	3	4	3	4	3	5	3	1
link with Mod. in column	2	3	4	3	4	3	4	3	6	0

Fig. 6 Algorithm for reconstructing the module sequence of a column basement using input data $N(S) = \{2a, b, 4c, 2d, e\}$ (Source: Nguonphan 2009)

system will implement an algorithm with the steps and procedural records as shown below and in Fig. 6 respectively:

1. If $N(S) \neq \{\emptyset\}$ pickup initial priority *module1* ($a, b, d, e\ldots$; see [9]) then
   a) from matrix lookup in row j of *module1* from left to right:
      i) if $v_{jk} = 1$ then
         (1) check $N(S)$ for availability of module type related to k column
            (a) if available then add *module2* to sequence S
               (i) $N(S) = (N(S)$ at current step) - *module2*
               (ii) if $N(S) \neq \{\emptyset\}$ then repeat step a) for case of *module2*
               (iii) else quit process
            (b) else go to next column and repeat step a)
         (2) else go to next column and repeat step a)
      ii) else ($v_{jk} = 0$) then go to next column and repeat step a)
2. else quit process

Proportions of Modules

Up to this point we were able to generate only a proper sequence of the modules. In this part we will present criteria that give each module the appropriate proportion. The module proportions of the temple elements are subjected to the length l and angle α of each module in the sequence. For our case study we have surveyed and analysed nine selective basement elements (Nguonphan 2009). The graphs of the lengths of the modules show that they vary according to their types and position in the module structure.

The type b, e, and f commonly appear once in a sequence, and could be set in a certain ideal ratio relative to the initial type a, which is set to equal 1 of the units as

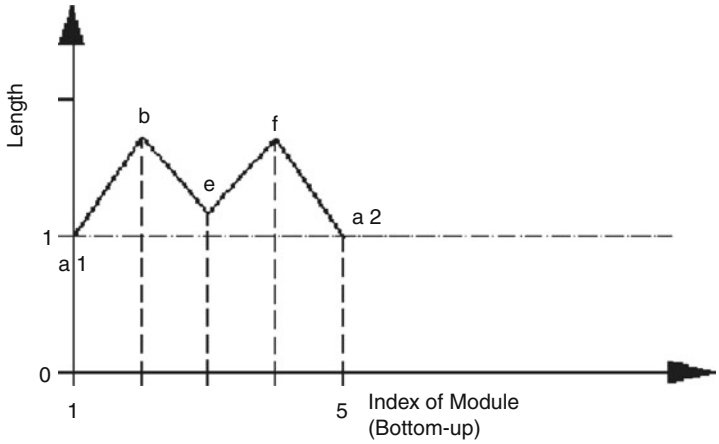

Fig. 7 Ideal length of module *a*, *b*, *e*, and *f* in a basement element (Source: Nguonphan 2009)

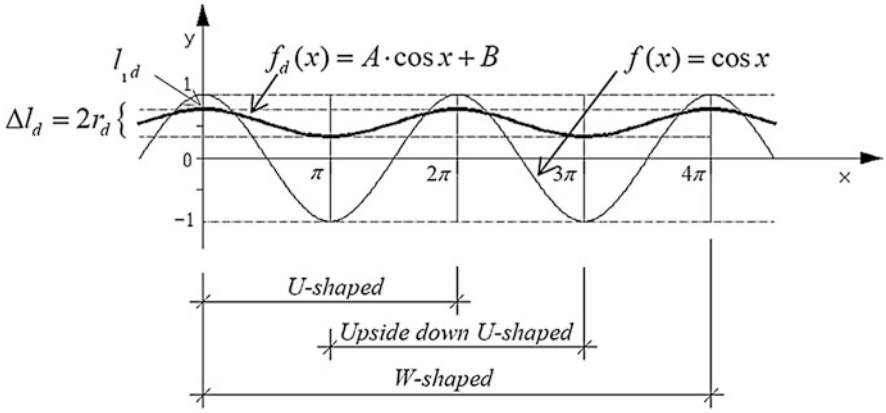

Fig. 8 Cosine function representing the length function of module type *d* (Source: Nguonphan 2009)

shown in Fig. 7. Proportions of *c* and *d*, which appear in a larger amount in a sequence, are suggested to be calculated through a cosine function (Fig. 8). We further discuss the module type *d* only, but the solution is identical for case of the module type *c*.

The length of the group *d* module type in a sequence vary by $\Delta l_d = A$ which is the difference between maximal and minimal length in that sequence. *B* stands for the initial length of its type, which is the largest value l_{1d}. Suppose that in a sequence the number of *d*: $N(d) = 6d$, and the profile of the basement element has the *U-shape* [9], then we obtain $l_{1d} = l_{6d} = 0.699$ unit (ideally). The lengths of the other four could be calculated from the function $f_d(x)$ as shown in Fig. 8.

The angle properties of the modules are handled similarly to their length. Survey and analysis shows that the vectors of module *a* and *e* are, in most cases, vertical and have the value as shown in (1). Module *b* and *f* on the other hand could be

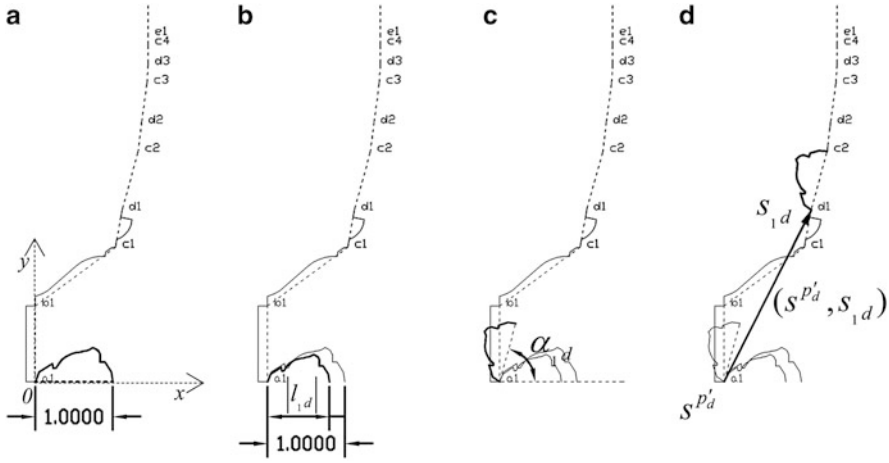

Fig. 9 Mapping modules to corresponding vectors. (**a**) initiating a *d* module profile at the origin; (**b**) scale to fit its vector; (**c**) angle translation; (**d**) map module profile on the vector (Source: Nguonphan 2009)

defined as (2). Using formula (3) we can compute the value of the ideal angles of *c* and *d*. Detailed discussion and calculations are presented in Fig. 9.

$$\alpha_t \cong \frac{\pi}{2} | \forall t = \{a, e\} \tag{1}$$

$$\alpha_b = \frac{7}{30}\pi \quad \text{and} \quad \alpha_f = \frac{23}{30}\pi \tag{2}$$

$$\alpha_{t_{(N-1)-i}} = \pi - \alpha_{t_i} \quad \text{for} \quad t = \{c, d\} \quad \text{and} \quad i = 1, 2, \ldots, N \tag{3}$$

Applying the relevant properties of a given set of modules for the construction of a given type of temple element at this point we would obtain a structure of module vectors without lotus motifs. Figure 9 demonstrates the final step. The lotus motifs presented in Fig. 3 will now be generated and mapped on the corresponding vectors one after another.

Software Development

For experimenting and proving our theory we have developed a software tool called *Angkor Temple Generator* (ATG). It is a plug-in or macro application built on the commercial software tool *AutoCAD* of the *Autodesk* company. One of AutoCAD's integrated development environments is the *Visual Basic for Application* (VBA) platform that works as a bridge between ATG and AutoCAD. It allows the user to

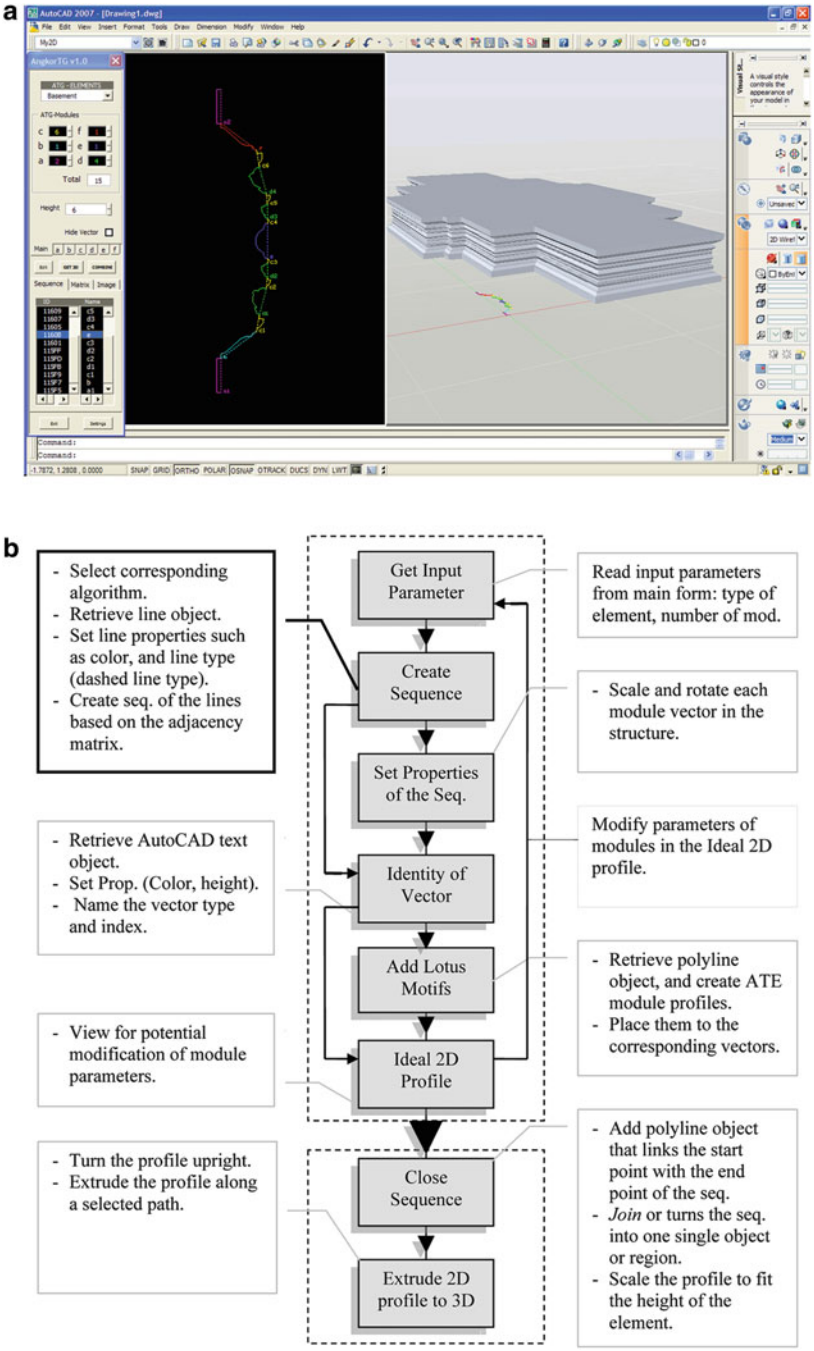

Fig. 10 (**a**) Graphical user interface of Angkor Temple Generator and AutoCAD. (**b**) Pipeline and architecture of ATG tool (Source: Nguonphan 2009)

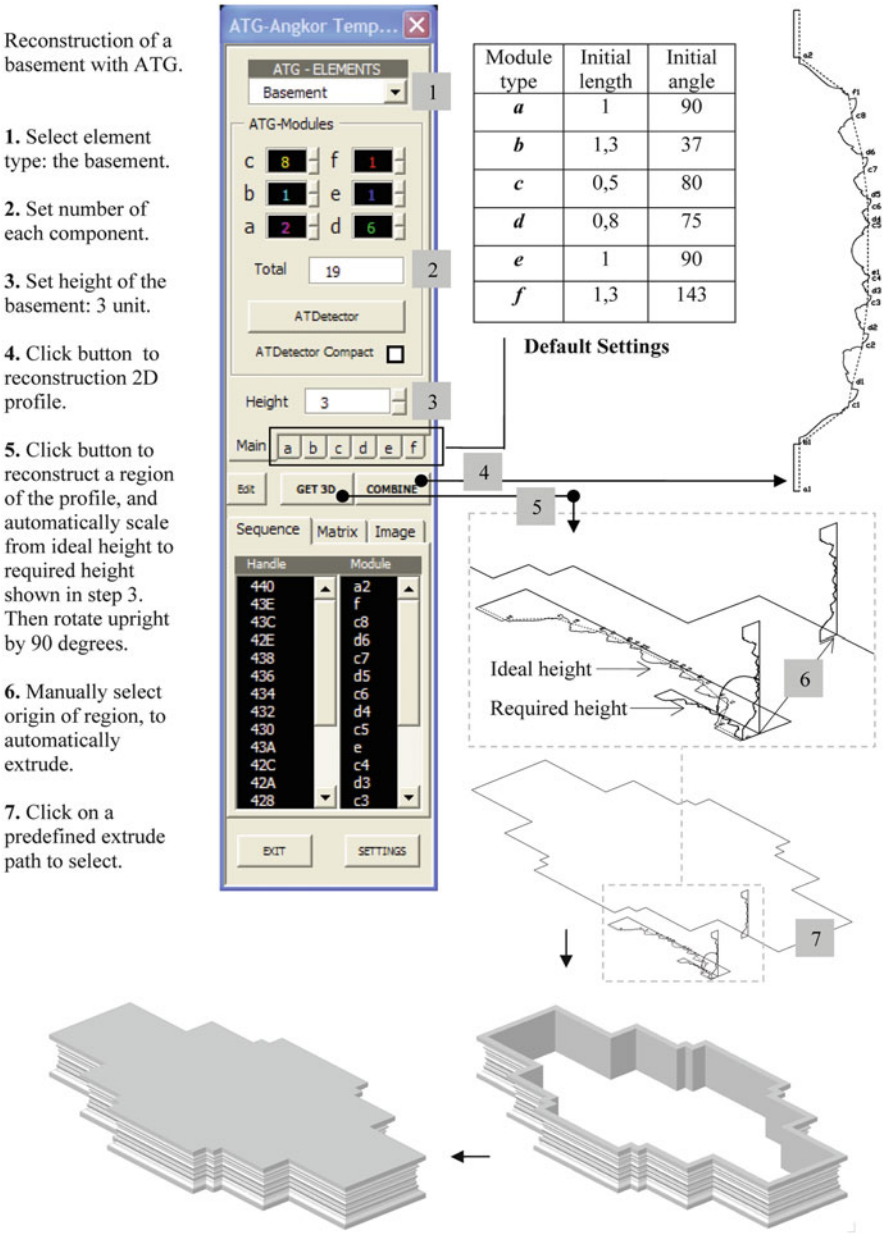

Fig. 11 Reconstruction of a basement using Angkor Temple Generator software tool (Source: Nguonphan 2009)

Fig. 12 3D Reconstruction using ATG. Angkor Wat temple complex (Source: Nguonphan 2009)

customize functionality inside AutoCAD, control its objects, and develop a graphical user interface.

ATG graphical user interface (GUI) was designed as compactly as possible to reserve large modelling areas. The control buttons and input boxes for parameter settings are arranged to meet the modelling workflow. Pipeline and software architecture is divided into two sections; generation of 2D element profiles, which represents the core discussion of this paper, and the 3D generation of the element based on the profile. Figure 10 presents the GUI of ATG (Fig. 10a, b) and describes the modelling procedure in a top-down direction. A step-by-step instruction for a 3D reconstruction of a basement element using ATG tool is introduced in Fig. 11.

Results and Conclusion

The results show that the earliest ancient Khmer temple architects and designers must have developed specific and solid architectural concepts that were used as prototypes by their successors for over seven centuries. Religious symbolism such as the lotus flower and its holy nature was without doubt one of the most significant sacred elements of their religion, and it was considered indispensable iconography in their temple construction. The Khmers obviously analysed the nature of the lotus flower and artistically interpreted the images into six different types of temple design elements. Moreover, our research has introduced constrained rules for the historic implementation of the lotus motifs as architectural elements.

This methodology is particularly designed for the 3D modelling of ideal Khmer Temples. Nevertheless we have proven that it could also be applied to the reconstruction of existing temple structures, especially the Angkor Wat-style temples and

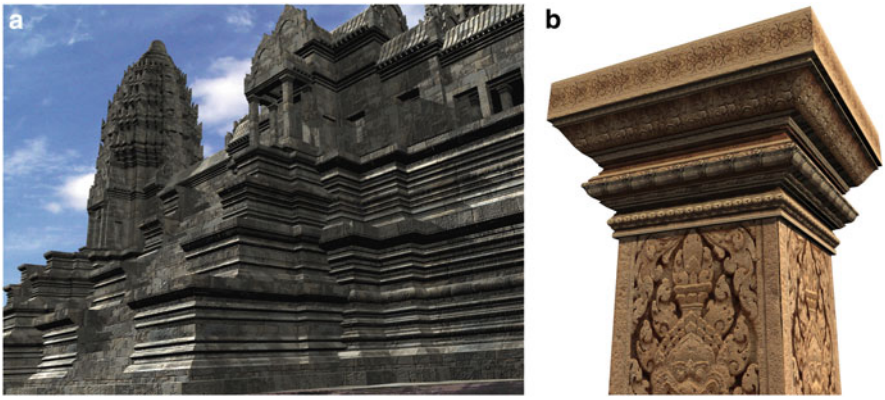

Fig. 13 3D Reconstruction using ATG. (**a**) 3D reconstruction using ATG for the central building of the Angkor Wat temple; (**b**) 3D reconstruction of a column of the Banteay Srey temple (Source: Nguonphan 2009)

those in the same construction period. In the case of the reconstruction of existing temple elements containing extremely complex structures of lotus motifs such as colonnettes or window grids, we suggest the *Angkor Temple Detector* (ATD) tool to be used in conjunction with ATG. ATD captures and reconstructs the profile of the temple element based on digital images as input data (Nguonphan 2009). The available software tool is a beta version and still needs to be improved and debugged (Figs. 12 and 13).

Acknowledgments I would like to thank Prof. Hans Georg Bock and Prof. Willi Jäger of the Interdisciplinary Center for Scientific Computing (IWR), Faculty of Mathematics at Heidelberg University/Germany for their valuable help in supervising my PhD thesis (2009) on the above summarized topic.

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Part IV
Virtualizing Heritage II: Computer Models for Building Research

The Giant Buddha Figures in Afghanistan: Virtual Reality for a Physical Reconstruction?

Georgios Toubekis and Michael Jansen

Abstract More than ten years after the destruction of the giant Buddha figures in Bamiyan (Afghanistan) the emergency stabilization works for the preservation of the physical remains at the site have progressed. The condition of the heavily fractured Buddha niches has been documented using the latest high-resolution laser scanning technologies. Rock stabilization measures have been realized successfully and the destroyed figures have been reconstructed virtually using old photogrammetric documentation showing the Buddha figures before their destruction. High-level scientific methods in cultural heritage preservation focus on the documentation and analysis of the physical material itself while the immaterial aspects of the tangible heritage have to be addressed carefully also. The increased use of digital technologies has opened up new possibilities for visual exploration and the metric analysis of objects. Apart from the question of how far a virtual reconstruction of the destroyed structures can solve epistemological research interests it has to be carefully considered how the understandable desire of the local population for the emotional re-experience of their lost monuments is addressed. Questions are repeatedly raised as to whether or not the physical reconstruction of the figures should be pursued. While UNESCO does not consider a total reconstruction of the Buddha figures to be feasible at the moment, the discussion of how to preserve the physical remains of the destroyed figures in the long-term is far from concluded. The question of how far the reassembly of remaining fragments in their original position is adequate for the long-term preservation of the physical remains of the destroyed Buddha figures is still not answered satisfactorily.

Keywords Virtual reality • Reconstruction • Preservation • Cultural heritage • Bamiyan

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Introduction: The Bamiyan Valley in Afghanistan

The Bamiyan Valley in Afghanistan is located at a height of 2,500 m around 250 km northwest of the capital Kabul within the Hindu Kush mountain range. It is characterized by its former monastic cave sanctuaries and dwellings which line up for several kilometres on the north side of the valley facing south, leaving the fertile plane open for agriculture. The site of the giant Buddha figures extends for 1.5 km and comprises more than 1,000 caves located at the broadest part of the valley. It was an important Buddhist pilgrimage centre in the sixth century CE. The caves at the site of the Bamiyan Buddhas were carved into the soft conglomerate cliff from the third to eighth century CE by Buddhist monks (Fig. 1).

Only a very few of them still bear the remarkable traces of wall paintings. The bigger, western Buddha measured fifty five metres and in some distance to the east the smaller, eastern Buddha rose thirty eight metres. Situated at the crossroads of the civilizations of East and West along the international trade routes of the Silk Road, Bamiyan is regarded as an exceptional testimony to, and outstanding representation of, Buddhist art in the Central Asia region. Buddhism disappeared from the region around the end of the first millennium CE. Remarkable archaeological remains of fortifications and urban settlements from the Islamic Ghaznavid and Ghurid periods are also located in the area. The Bamiyan Valley was invaded and burnt by Genghis Khan in 1229 CE. Although it has been the subject of very little scientific investigation, Bamiyan became a tourism hotspot in the late 1960s and 1970s. With the Soviet invasion of Afghanistan and the outbreak of a yearlong internal military conflict, a silence fell over Bamiyan until the worldwide outcry against the destruction of the giant Buddha figures at the very beginning of the twenty-first century. International intervention and protest could not prevent their complete and deliberate destruction in March 2001 at the climax of an iconoclastic campaign against all non-Islamic cultural heritage in the country ordered and initiated by the Taliban leadership.[1] The internationally condemned act of demolishing the Buddha figures (Fig. 2) was carefully planned as the inaugural act of a barbaric scene of unprecedented dimension that came the same year as the attacks in New York on 11 September 2001. By the end of 2003 the cultural landscape and archaeological remains of the Bamiyan Valley were nominated a UNESCO World Heritage Site according to the 1972 World Heritage Convention, comprising eight individual areas that represent artistic and religious developments from the first to the thirteenth century CE.

[1] During a period of weeks Taliban troops raided the storage rooms of the National Museum in Kabul and destroyed masterpieces of Buddhist art. Finely moulded clay figures and stone friezes depicting scenes of Buddha worshipping were broken in the boxes where the museum staff had preserved them during the confusion of the military conflicts of the 1990s. The destruction of the Buddha statues in Bamiyan took place simultaneously. The series of events is documented in Warikoo (2002).

Fig. 1 The cliff of the Bamiyan Valley with the empty niches of the giant Buddha figures (acdc 2003/Pierre Smars)

Fig. 2 Big Buddha (fifty five metres) statue before and after destruction in 2002 (acdc 2004/ Georgios Toubekis)

Under appeals from UNESCO and the International Council on Monuments and Sites (ICOMOS), the Aachen Center for Documentation and Conservation (RWTHacdc) at the Architecture Faculty of RWTH, Aachen University, among others, currently cooperates in the preservation of the World Heritage Site at Bamiyan. Our approaches are based on the vision of international cooperation defined in the UNESCO World Heritage Convention and are guided by the set of internationally acknowledged charters of ICOMOS, which define the ethical and technical standards for interventions on physical remains of the past. The decisive knowledge on technical methods and formal procedures executed in a living framework of partners (conservators, site managers, local communities and other

Fig. 3 Small Buddha (thirty eight metres) niche with original plaster remains on back side and figure fragment in front (acdc 2006/Georgios Toubekis)

stakeholders) is essential to ensure long-term preservation goals, especially for activities within World Heritage areas.

UNESCO/ICOMOS Project for the Safeguarding of the Bamiyan Site

Very soon after the fall of the Taliban regime in 2002 a UNESCO fact-finding mission to Bamiyan was undertaken. The technical aspects of the mission revealed that despite the overall deplorable condition of the site many fragments from the destroyed figures were found to bear their original surface features within the rubble of dust and sand. Also, widespread rumours that the Taliban had transferred large portions of the remains away from the site could be refuted. While the detonations destroyed the western Buddha some original parts of the thirty-eight metre eastern Buddha figure survived the explosion, including fragments of the original plaster *in situ* (Fig. 3). On the other hand questions arose of how to deal with the entire site and the vast remains in the coming years. Following the recommendation of the *First International Seminar on the Rehabilitation of Afghanistan's Cultural Heritage* which took place in May 2002 in Kabul, a safeguarding project was initiated by the Government of Japan under the coordination of the Ministry of Information and Culture of Afghanistan and UNESCO. The range of possible interventions was discussed and emotionally argued between two extreme positions—the complete rebuilding of the figures on the one hand, and, on the other, leaving the site and

remains untouched. In order to evaluate any proposal from a technical and ethical point of view it is necessary to remind the internationally accepted principles of conservation.

Modern Conservation Theory

The conditions, goals and principles of archaeological preservation, and the practical implications of safeguarding cultural heritage for future generations have been acknowledged on an international level primarily with the formulation of the *International Charter for the Conservation and Restoration of Monuments and Sites—The Venice Charter* in 1964, which is also regarded as the foundation document of ICOMOS.[2] The charter defines the application of theory, methodology, and scientific techniques to the documentation and conservation of architectural and archaeological heritage. Besides a commitment to the highest technical standards the charter also promotes the ethics to which all applied measures and experts involved in the conservation domain must adhere. In particular the 'safeguarding of traces' is propagated as the goal of modern preservation practice (Petzet 2004). This appeal to hand historic monuments to future generations in the full richness of their authenticity was recognized by UNESCO at the *Convention Concerning the Protection of the World Cultural and Natural Heritage* (Paris 1972). It has to be stressed, however, that it is the state parties themselves that have the primary responsibility for the maintenance of their own sites and monuments. The role of the international community is limited to mobilizing opinion and expertise in order to make proposals for appropriate action.

A Preservation Strategy for the Giant Buddha Fragments

A concept for the preservation of the Buddha fragments and the long-term conservation of the remains was first presented by Michael Petzet, the president of ICOMOS International at the ICOMOS General Assembly in December 2002. The frame of options was determined by two alternating positions: preserving the state of the monuments after the destruction and keeping the site unchanged as a kind of memorial to the deliberate demolition of cultural artefacts, or a reconstruction of the monument's state before the destruction. Since parts of the rock cliff affected by the explosion needed immediate consolidation and the remains of the paintings inside the caves required conservation treatment, ICOMOS proposed an intervention strategy based on internationally accepted principles of conservation. The 1972 World Heritage Convention defines the limits of any kind of

[2] A collection and summary of the international charters for cultural heritage conservation and restoration can be found in (ICOMOS 2004) and can be downloaded from http://www.icomos.org.

reconstruction as "only acceptable if it is carried out on the basis of complete and detailed documentation on the original and to no extent to the conjecture" (UNESCO 2005, §86: 22). Therefore the required emergency consolidation work was to be complemented by a comprehensive documentation effort to establish the sound scientific basis for future decisions.

> [...] reconstruction is not expressly forbidden by the Venice Charter, as is often maintained. However, based on the Charter's highly restrictive overall attitude also in regard to replacements, we can conclude that the authors of the Charter were certainly very sceptical of all reconstruction work: Although reconstruction is not 'forbidden' the pros and cons must nonetheless be very carefully weighed. Just as a reconstructed completion that is based on insufficient evidence or questionable hypothesis in fact falsifies a monument, so an unverified 'creative reconstruction' cannot really restitute a lost monument, not even formally – an certainly not in its historical dimension. (Petzet 2002, 189)

Conservation activities started within the UNESCO Campaign for the Preservation of the Bamiyan World Heritage Site funded by the Japanese government. With additional funding from the Culture Section of the German Foreign Office ICOMOS, Germany has been actively involved since 2003 in the international expert campaign (ICOMOS 2005; Petzet 2009). Under the supervision of Michael Jansen, the RWTH Aachen Center for Documentation and Conservation is documenting the recovery works of the Buddha fragments in close collaboration with restorers and stone conservators from ICOMOS and UNESCO. All works are embedded in the recommendations of the ICOMOS/UNESCO Expert Working Group for the Preservation of the Bamiyan Site, which acts as an advisory board to UNESCO and the state party on measures that may affect the heritage site (UNESCO 2011, 2012). In various yearly meetings since 2002, the involved international experts have been coordinating efforts with the Ministry of Information and Culture of Afghanistan. The expert working group reviews and monitors actions before and after their realization as a means of quality control. Conservation activities have to be integrated in sustainable development plans that both meet the requirements of protecting the inherent value of a cultural site and identifying the economic and social benefits (such as income generation from tourism activities) to the local communities. Due to the devastating impact of the prolonged military conflict on cultural and planning institutions within the administration and education sector, capacity building remains an urgent priority. The improvement of national laws and cultural policy frameworks are a necessary part of such an integrated planning approach.

The Bamiyan Cultural Master Plan

Though the Bamiyan figures had long ago lost their original religious meaning as symbols of worship they kept their original function as a topographic and metaphoric landmark in the Valley of Bamiyan and its inhabitants. As reflected in local oral traditions of the Islamic population, the Bamiyan Buddha statues were regarded as representations of old mythological figures and are to the present day an essential component of the self-identity of the Hazara ethnic group within the

Central Hindu Kush. Apart from the well-known giant Buddha figures, the UNESCO World Heritage site in Bamiyan comprises eight archaeological entities embedded within a cultural landscape that is under enormous pressure from overall development activities. Since the land resources in the valley are limited the local authorities have had problems providing sufficient and appropriate residential areas to meet the demand of the increasing incoming population. In 2002, upon the request of the local government at that time, private NGOs provided new house constructions for around 200 families that had occupied some caves which are now considered the main heritage site. The design and inappropriate location of this new settlement was repeatedly criticized by its inhabitants and has since been the subject of various internationally broadcasted documentaries. The interest in preserving cultural remains was here contrasted with the need to improve the living conditions of local communities.[3] While major road networks and basic infrastructures are gradually improving, changes resulting from various urban development activities are increasing rapidly, affecting the living conditions of far more people. Local governmental leadership has taken these critics seriously and is looking for opportunities to make the cultural values of the area an essential component of the development strategy for the future of the valley.[4]

In this context RWTHacdc proposed and conducted an extensive survey on the vernacular architecture of the valley (Fig. 4) and its important traditional irrigation system. From these findings a cultural master plan was elaborated for the long-term management of the cultural landscape and the archaeological remains. It defines the preservation goals and provides guidelines for the sustainable development of the entire Bamiyan valley. Though broadly accepted by all stakeholders in 2006, the implementation of the cultural master plan is hampered by the lack of consistent development policies of the national government, international donors, and executing agencies on the ground. Recently, large infrastructure projects have been executed

[3] Editor's note: This conflict of the relocation of the cave dwellers around Bamiyan was discussed in the film *The Great Buddhas* by the Swiss filmmaker Christian Frei (2005). The conflict between the presence of local inhabitants on or around an active site, which is declared cultural heritage goes often back to colonial times. In this volume, Sengupta discusses this issue with regards to institutionalized strategies of the British-colonial Archaeological Survey of India on declared heritage sites and supposedly 'dead' ruins. Falser mentions this process of 'archaeologizing heritage' through the relocation of local inhabitants for the site of Angkor Wat during French colonial times after 1900. Luco discusses the phenomenon of local inhabitants continuing to live on ancient land patterns, whereas Warrack explores ways and means to include the tacit knowledge of the local stakeholders in the decision-finding process to restore heritage.

[4] Remarkably, since 2005, Bamiyan province has had a female governor who has introduced cultural preservation and education as a pillar of the local development agenda. The central government expects thousands of returnees to the province in the coming years. The provision of suitable settlement areas remains one of the main challenges for the future. As observed from satellite images, in the last few years the amount of new constructions increased in the direct vicinity of the archaeological area without proper developmental control, underlying the need for long-term development and regulated urbanization plans.

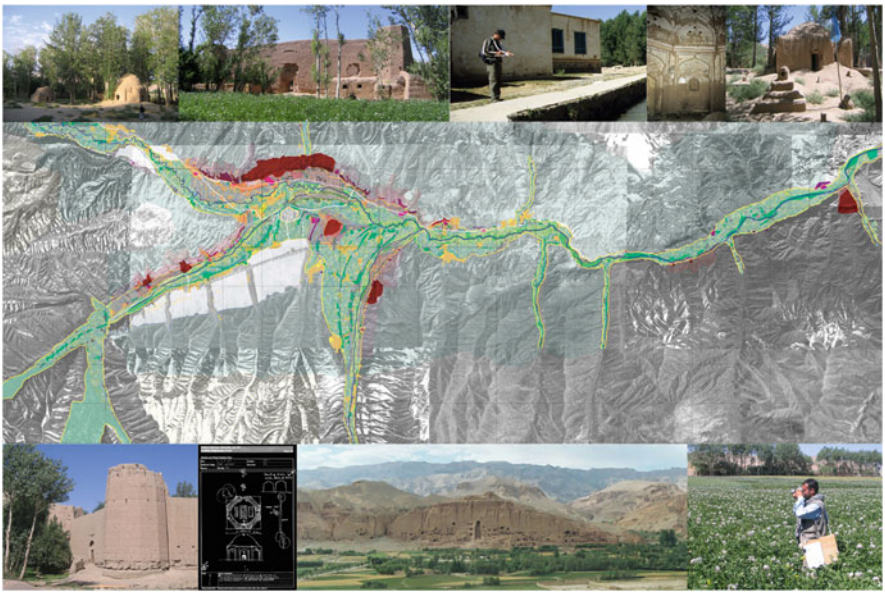

Fig. 4 Cultural master plan for the Bamiyan Valley (acdc 2005/Daniel Lohmann, Georgios Toubekis)

without proper assessment of their impact on the social and cultural context, although such environmental impact assessments are obligatory by national law.

3D-Documentation and Virtual Environments for the Visualization and Interpretation of Preservation Strategies

In regard to the situation at the site of the destroyed Buddha figures it was necessary to use a documentation method that was able to capture the amorphic geometry of the niche and the delicate condition of their ruptured back walls as accurately as possible.

In cooperation with the Technical University of Vienna (Prof. Marina Döring of the Institute of Historic Building Research) a 3D laser scan was realized by Irmengard Mayer within a period of only few days. A Riegl Laser Measurement System Z420i in combination with a digital camera mounted on top of the scanner was used (Fig. 5). The scanner automatically rotates and captures up to 10,000-point measurements per second. The system allows for a very flexible alignment of the resolution according to the scan size and the scan distance (2 m up to 2,000 m). The resolution from the different scan positions was set to ensure a measurement point distance equal to ten millimetres on the surface of the cliff stone. In addition to the individual point measurements of the 3D laser scanner a set of images was taken automatically after each scan by the digital camera mounted on top of the

Fig. 5 Laser Scan System Riegl LMS 420i with on-top mounted digital camera (acdc 2006/Irmengard Mayer)

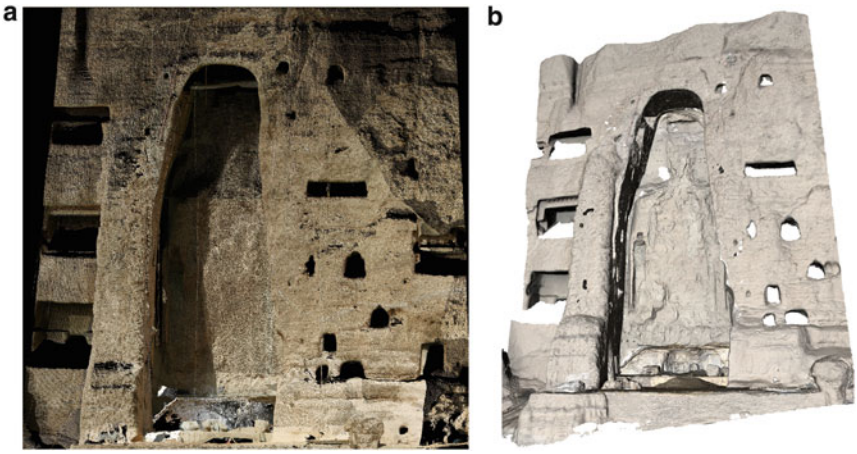

Fig. 6 (**a**) Coloured laser scan point cloud of small Buddha niche; (**b**) Triangulated surface model from the 3D laser scan of the thirty-eight metre Buddha niche (acdc 2006)

scanner. The system automatically assigns the colour information of each pixel from the digital image to the point cloud measurements (Fig. 6a).

The off-site post processing of the data included the triangulation of the individual point measurements and the final texturing of the triangulated mesh with the colour information from the digital images taken on site. In this case 1.2 million triangles were created out of the seventy-seven million measurement points (Fig. 6b). The scan procedure and the generation of the 3D model of the eastern Buddha have been described in detail (Jansen et al. 2008).

The next step was to virtually reconstruct the shape of the destroyed Buddha figures from historic documentation materials. With automated mathematical methods for model generation from images, a digital reconstruction of the fifty-five metre Buddha has been performed based on the historic stereoscopic documentation of a Swiss survey team in 1974 (Kostka 1974; Grün et al. 2002). The entire central part of the Bamiyan rock cliff was also documented by means of stereoscopic analysis during Japanese explorations in 1970–1978. The National Research Institute for Cultural Properties (NRICP) in Nara (Japan) produced at that time an exhaustive scaled isoline drawing from metric images of the entire cliff including both giant Buddha figures (Higuchi 1984). From this documentation the team at RWTH Aachen obtained a high-resolution scan of the original contour line interpretation 1/50 scale ink drawing of the Buddha figures. In this drawing each of the ten centimetres isohypse contour lines of both Buddha figures is clearly readable. After photogrammetric rectification the scans were manually digitized and a 3D surface of the thirty-eight metre Buddha was generated with Geomagic Studio software. Based on characteristic features visible in the contour line drawings and in reality, the generated surface model could be orientated by manual alignments within the 3D model of the niche previously obtained from the laser scans (Toubekis et al. 2011). Consequently the final 3D model (Fig. 7) is a virtual representation of the figure and the cliff in two different moments in time.

This image shows the current condition of the niche and superimposes the still existing monument features with the condition at the moment of its last extensive documentation years before its destruction. The final result is not a total reconstruction in the sense that is shows the 'original' condition of the monument at a given moment in time. It is primarily intended to serve as a communication tool for representation and interpretation—to serve as a visual exploration tool for the different results obtained up to this point by the project. The result is adequate enough to serve as a working model that is able to integrate all on-going research results from restorers and geologists and to serve as the planning basis for future interventions on the site. Also, it is comprehensible enough to contribute to the discussion process on the future of the site in the sense of a work in progress without pre-assuming a final state that has to be achieved. Based on this virtual model it is possible to study and to compare concepts aimed at future technical measures in detail prior to their execution. The model approach proved to be much more comprehensible than conventional 2D plan drawings especially in a dialogue with non-technical experts related to the project.[5]

[5] Editor's note: Here, the conceptual difference between surface-oriented renderings (in this volume discussed by Gruen, also with a case-study of the Bamiyan Buddhas) and renderings on the basis of building research and archaeological surveys (Toubekis/Jansen, compare the contribution of Cunin) becomes evident. Interestingly, historic photographs from earlier documentations (compare Weiler) are also used, digitalized, and converted (transcribed) into virtual models. The question of how these renderings between the real and a desired condition of the archaeological site are also useful for the local community, which does not in most cases share the same technical knowledge in readings these interpretations, is another problem often ignored by 'Western' campaigns (compare Chermayeff in this volume).

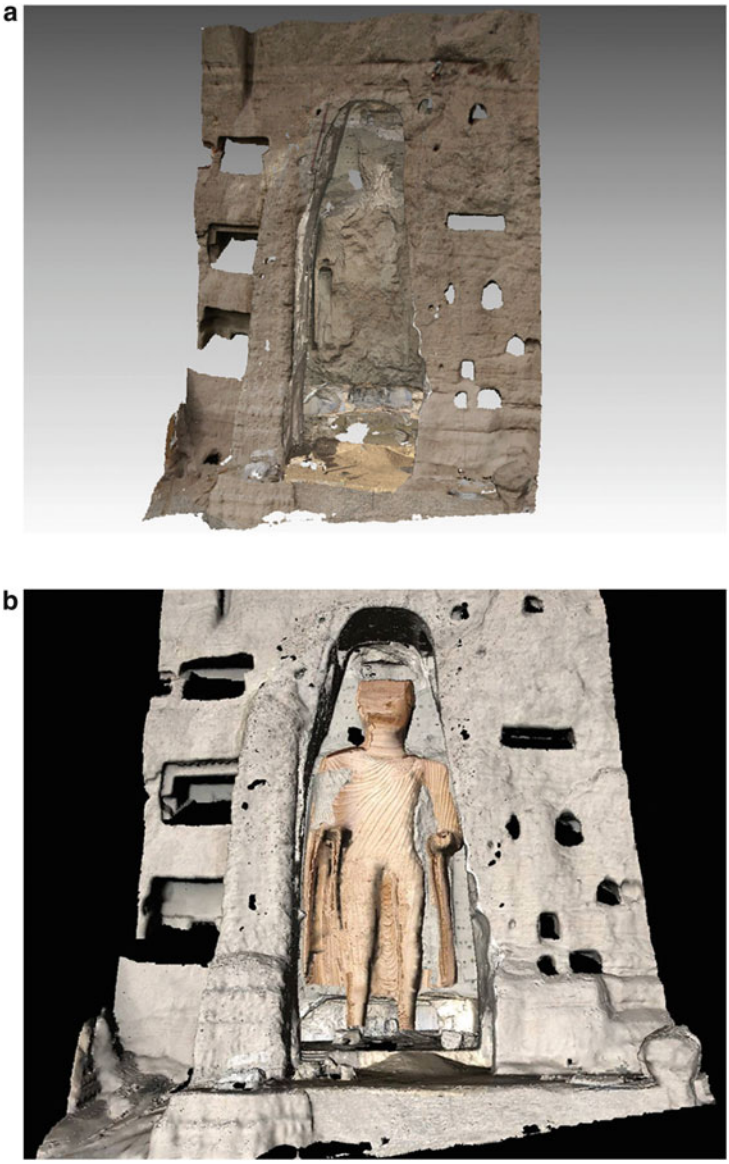

Fig. 7 (**a**) Textured surface model of the empty niche; (**b**) Textured model of the reconstructed small Buddha figure (acdc 2006)

Long-Term Conservation of the Bamiyan Buddha Fragments

Nevertheless, from the final 3D model it was possible to create conventional architectural plans such as sections and views from all viewpoints. Based on these plans rock mechanical stabilization works could be planned and executed. In the meantime, the backside of the eastern Buddha niche has been successfully consolidated. The destroyed separation walls in between the ceremony halls at the bottom backside of the 38 m Buddha niche were were successfully restored—this physical restoration on the one hand contributes to the overall stability of the back wall, and, on the other, makes the former spatial configuration of the *pradakshinapata* (the spiritual circumambulation) around the former feet of the giant Buddha figure physically recognizable again.

Since the Venice Charter explicitly states that only anastylosis, that is to say, the reassembling of existing but dismembered parts, can be permitted, the possibility of reusing the existing fragments from the original figures was a subject to be seriously investigated. The plans obtained from the high-precision measurements are also the basis for the documentation of the geological profile of this portion of the cliff. Tests on site revealed that the geological features of each fragment can be identified in the composition of the conglomerate cliff stone. For larger fragments it is therefore possible to identify their place of origin based on geological profile matching (Urbat and Krumsiek 2004; Urbat 2009). The analysis of the individually preserved Buddha fragments is still ongoing. Many cliff fragments showing traces of the original monument have been safeguarded and several thousand individual surface plaster fragments have been documented and stored in protective shelters. From these plaster fragments important scientific results can be gained that provide information about the different original colouring of the figure over the course of time.

When in contact with water the conglomerate material dissolves completely into grains of different sizes. Currently the larger fragments are stored in protective shelters in direct vicinity to the empty niches. Although the original figures are destroyed completely their physical appearance is still present in the valley and is embodied in the empty niches. How far this shape has to be reconstructed in future interventions—such as a full or partial anastylosis—in order to make the physical appearance more complete can now be evaluated comprehensively by making use of advanced VR technologies.

Giant Buddha Figures Pictorial Representation in Time: Heritage Documentation Between Personal Narrative and Scientific Documentation

Little was known about Bamiyan until the explorations of various British military officers in the period of the first and second Anglo–Afghan Wars in the nineteenth century. First, sketchy illustrations of the Bamiyan Buddha figures were prepared

Fig. 8 Karl Ritter's depiction of the Bamiyan Buddhas as published in 1838 after the earlier sketches of Alexander Burnes. The Buddha figures are showed at a distance to each other, possibly to make them fit into the usual book format of the time (Source: Ritter 1838, Tafel 1)

by Sir Alexander Burnes as illustrations for his personal travel memoirs in the first half of the nineteenth century (Burnes 1834). Acting as military agent during the colonial endeavour of the British Empire crossing from India into Afghanistan Burnes carefully observed the political as well as the social and historic environment of this country still regarded as a young national entity in between the rivalling Russian and British spheres. The narratives of his adventurous travels inspired the fantasy and imaginations of the, at that time, new 'oriental' academic disciplines in the West. Though quite exotic in its nature his original depictions of the Buddha statues *The colossal idols at Bamiyan* were copied numerously in Europe and provided first evidence of the encounters of Graeco-Roman heritage with the Buddhist traditions of India in these remote mountains of Afghanistan, an idea up to that time only assumed by few scholars (Ritter 1838, Fig. 8).

In the following years of upheaval during the Anglo-Afghan war the site of the Bamiyan Buddhas was described by the officer James Lewis, who deserted from the British forces in India and served as secret agent to the Government of India at Kabul under the name of Charles Masson. His numerous reports included sketches of various historic sites all over the country and his well-documented personal interests in antiquities of all kinds attributed to the notion of archaeology as adventurous treasure hunting, as it was seen in those days.

The first accurate illustrations of both figures and the entire cliff were provided by Maitland and Talbot during their topographic surveys for the Afghan-Boundary Commission (Fig. 9). On the their journey back from Herat to Kabul they prepared more detailed drawings of the Bamiyan valley and the Buddha figures in the autumn and winter of 1885 (Talbot et al. 1886).

In the beginning of the twentieth century king Amanullah initiated a modernization campaign for its country. The signing of the Franco-Afghan archaeological convention in 1922 allowed for the first time systematic archaeological investigations to take place in Afghanistan conducted by the newly created

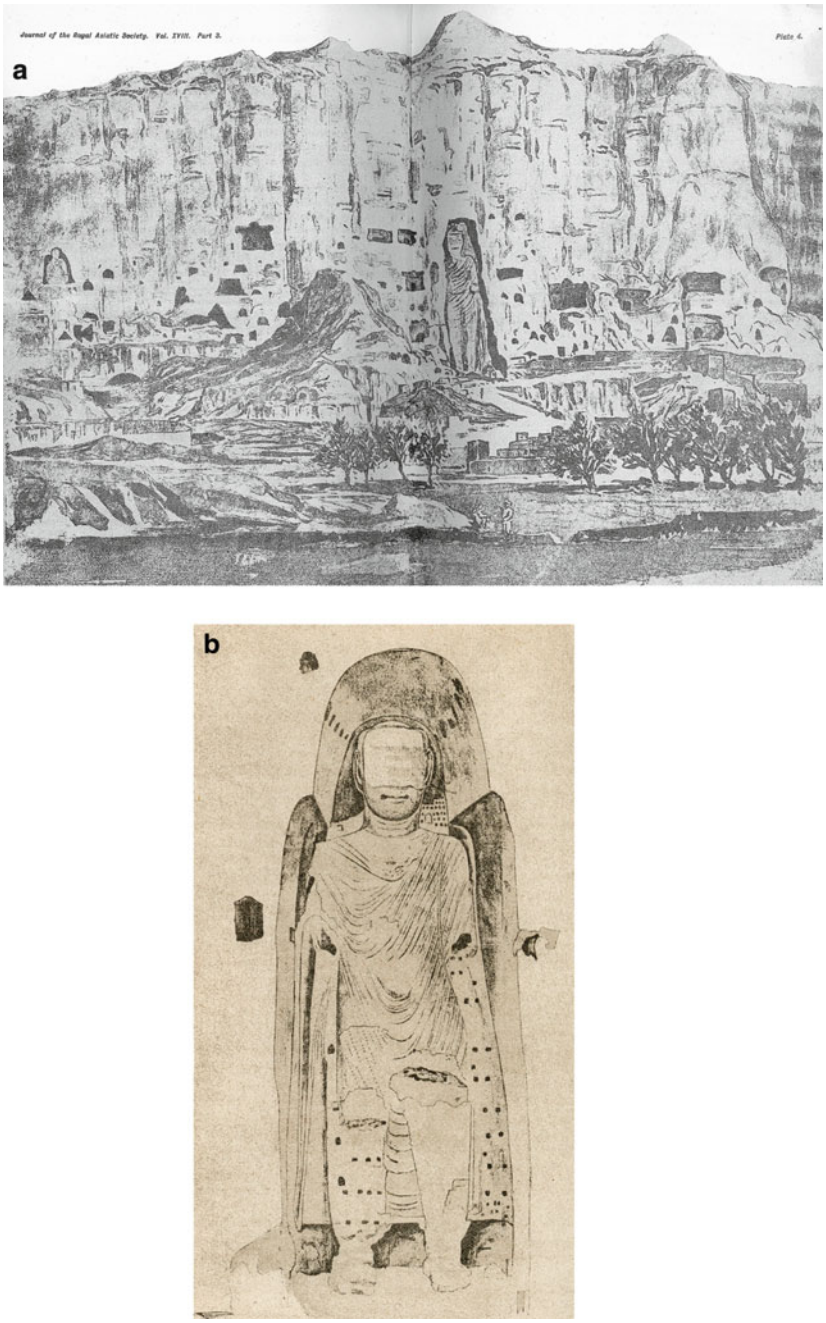

Fig. 9 (**a**, **b**) Captain Maitland's drawing of the giant Buddha figure and the portion of the cliff showing the small Buddha statue done in the winter of 1885 (Source: Talbot et al. 1886, plates 4 and 5)

Fig. 10 Photograph of the giant Buddha figure in 1933 by DAFA (Source: Hackin 1933, plate XX, Fig. 22)

permanent *Délégation Archéologique Française en Afghanistan* (DAFA). Endowed with exclusive rights for research the French archaeologists realized broad excavation campaigns throughout the country revealing physical evidence of the many cultures that have passed this territory. Their extensive use of photography (compare Weiler in this volume) at that time for the scientific documentation of the most significant monuments provided valuable information on the appearance and conditions of the monuments in Bamiyan (Hackin and Meunie 1933; Hackin et al. 1959) (Fig. 10).[6]

The archaeological remains in Bamiyan and its special cave art came into focus again in the second half of the twentieth century and provided remarkable insights from an art historic as well as architectural point of view. Studies on the stylistic analysis of the wall paintings revealed that Bamiyan must have been a particular place in ancient times where influences from the West and the East resulted in entirely new artistic expressions of Buddhist monastic life (Miyaji 1976; Tarzi 1977; Klimburg-Salter 1989).

In order to prepare the site for international tourism activities during 1969–1978 a restoration campaign was initiated by national authorities with the aid of the Indian government and the *Archaeological Survey of India* (ASI). Rock stabilizations on those fragile parts of the statues in danger of collapse were executed successfully and detached mural paintings were restored carefully. The restoration measures were executed with such quality that, for the common visitor,

[6] DAFA worked continuously in Bamiyan until the outbreak of World War II. Already in 1934 the first tourist guide for Bamiyan was published summarizing the scientific outcomes of the first missions, and was edited for an interested international audience. A notable detail here is that this tourist guide was also translated into the German language in 1939 (Hackin 1934; Hackin and Hackin 1939).

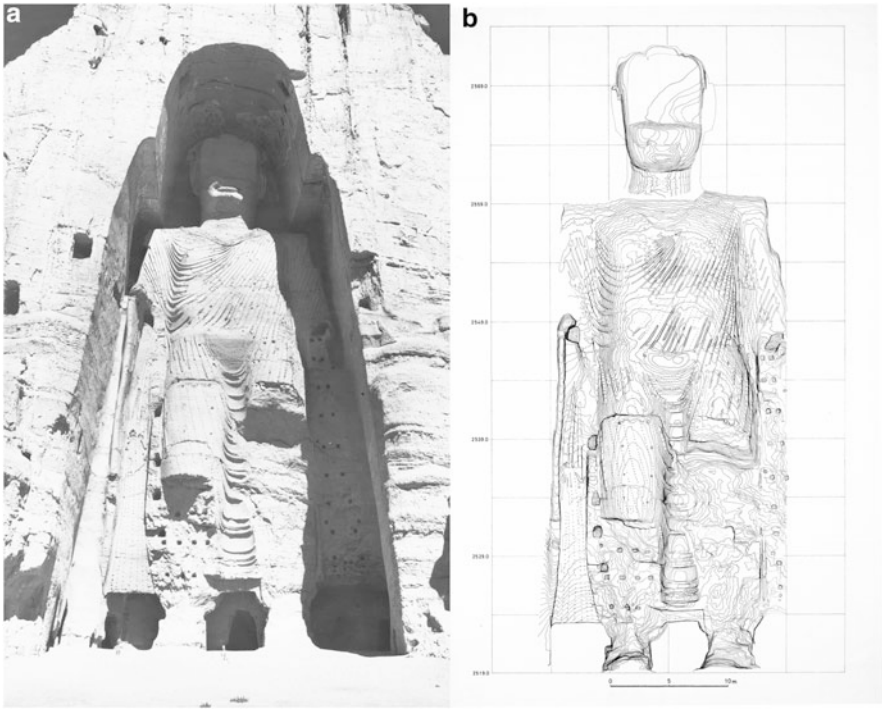

Fig. 11 (**a**, **b**) Metric correct image of the giant Buddha figure and isoline drawing derived from manual interpretation of the stereoscopic images of the Bamiyan cliff (Courtesy of Kyoto Archaeological Mission to Central Asia and the National Research Institute for Cultural Properties Tokyo/Nara)

even the modern addition of materials fitted harmoniously into the original fabric and was hardly distinguishable (Sengupta 1984). In the same period further documentation activities were carried out by Japanese research teams who were surveying all cave structures in the vicinity of the Buddha figures using contemporary stereographic and photogrammetric techniques (Fig. 11a, b) (Higuchi 1984). This Japanese documentation is the basis for the on-going monitoring of the condition of the caves along the main Bamiyan cliff.

The mural paintings that can be found inside some of these caves have suffered enormously in the last three decades and have been subject to a special conservation programme initiated by the NRICP Tokyo since 2003. Here latest scientific analysis methods were applied yielding extraordinary new insights into painting techniques in ancient times. Various oil types were used as binding agents in some of the paintings in Bamiyan revealing them to be the oldest examples of such a technique recorded up to now. The conservation activity is supported by high-level documentation techniques such as high-resolution digital imagery and electronic short-range measurements (Taniguchi 2007).

The various accumulated documentation material serves as a supplement to the principal source, which is the monument itself. The material as well as the immaterial aspects of its values is embodied in its physical existence, which is why the World Heritage Convention has codified the preservation of the 'authenticity' and 'integrity' as most important requirements in order to maintain a monument's value. Documentation materials in research activities such as photographs and drawings help in this regard to facilitate the understanding of a monument from various points of view as long as the original source (the monument itself) is existent. Once the original monument is lost or no longer exists, the role of documentation material (photographs/drawings) changes significantly. Since they capture aspects of a previous state in time they are suddenly to be regarded a principal source that must be regarded more critically. Besides the methodological questions on the use of documentation technologies the aspect of 'thruthfulness' in relation to the lost original has to be considered but also new aspects of the meaning of the monument's value. In the case of the Bamiyan Buddhas this situation can be described in such a way that the destruction of the figures has added a new aspect to the monument's memorial value over time. In the on-going discussion about how to deal with the monument as a whole and respect the 'full richness of its authenticity' (Venice Charter), imagitive images or 3D techniques such as virtual realities allow conservation experts to deal and experiment with alternatives and to come closer to the question of 'how a historic structure might have looked and how it may look again'. This also explains the increased interest of many people who are going far beyond those with purely scientifically interest in the topic.

Virtual Environments of Archaeological Heritage: Opportunities and Limits

Virtual environments are a specific form of 'interactive' communication and representation tools. At the Virtual Reality Centre of RWTH Aachen University the immersive virtual environment BARCO CAVE™ is used for research on multimodal interactions and visualization of complex numerical and technical 3D simulations in real time. The CAVE (Cave Automatic Virtual Environment) system is a cube of three metres by three metres that creates a five-sided projection of stereo images onto the walls and ceiling. The user of the CAVE wears a special pair of polarized glasses so that his head's position in space is constantly measured by an optical tracking system. The system allows for an 'immersive' experience—this means the projected views are constantly adapted to the spectator with the tracked glasses providing a very intuitive way for exploring details of the 3D model. Additionally, up to five spectators (with untracked polarized glasses) can fit into the projection space and share the experience of the one wearing the tracked glasses. Although the system can be folded up into a four-segment screen twelve metres in length the spatial limitations and bulky projector installations are an obstacle to presenting this technology at locations other than the research

Fig. 12 Immersive Virtual Environment CAVE at the Virtual Reality Center in RWTH Aachen Computer Lab (VDI 2009/Thomas Ernsting)

environment. The results of the virtual model from the Bamiyan 3D documentation and virtual reconstruction of the smaller Buddha were presented for the first time on the occasion of the fifth UNESCO Expert Working Group meeting for the Preservation of the Bamiyan Site in December 2006 at RWTH Aachen University. It has since been used several times during technical consultations with restorers and engineers in the planning phase before executing measures on the site. In order to present the results to a larger audience at the Federal Exhibition Hall of Germany in Bonn within the context of the exhibition of Gandhara Art in 2008, a simplified passive stereo projection[7] was realized by the Collaborative Virtual and Augmented Environments Group of Fraunhofer Institute for Applied Information Technology (FIT) in Bonn/Birlinghoven (Fig. 12).

Amid the audience a 3D navigation device was installed to animate the spectator allowing him to explore the three dimensional environment freely while the projection followed a fly-through sequence along a predefined path. Although the system allowed the rendering to adapt to user interaction in real time

[7] A space of fifty square metres with a three metres by four metres projection screen was designed to be used by forty people at a time, and a standard stereoscopic setting was chosen using low cost polarized paper glasses. In order to realize the real-time rendering of the entire cliff scene including the niche of the eastern Buddha and the reconstructed 3D model within the limitation of the museum environment, the data had to be reduced significantly to a total amount of 200,000 triangles.

the larger number of visitors preferred to use the predefined path in order to study the preselected points of interest assumed to have a higher value or meaning than freely chosen positions.[8]

Besides the aspects of navigation the lesson learnt here is that such a technology also requires a specific type of communication concept addressed to the specific audience. Like that, the expectations of a survey expert can be contrasted with the demands of decision makers who request the visualization of alternatives rather than the optimal representation of a pre-defined choice. Virtual environments have proved their usability in supporting engineering and planning processes as well in the evaluation of alternating scenarios in simulation applications. The lesson learnt here is that a requirement analysis for virtual environments is necessary to reflect the type of audiences addressed together with an idea of 'which story to tell' in order to achieve a positive response of user of such a system.

Conclusion: Virtual Communities for Inter-Cultural and Inter-Generational Cooperation

Besides the recording of past events and the documentation of present conditions, cultural heritage management also covers the evaluation of conservation concepts as well as their concete execution. In order to ensure long-term preservation goals a sustainable preservation strategy for a site has to ensure the understanding and appreciation of the specific monument character by obtaining the cooperation and support from local communities and involved stakeholders. In the case of the preservation of the Bamiyan site an international cooperation has been initiated by UNESCO involving experts that are dispersed globally, crossing languages and research methods. Furthermore, there is the broad global attention of a younger generation of interested public who are using new communication technologies to express their thoughts and make their contributions.[9]

The obligation to protect cultural heritage, as laid out in the World Heritage Convention of 1972, is a commitment that the undersigning state party willingly submits to by nominating a cultural or natural site to be included into this programme. While preservation practice has been primarily focused on the physical material, owing to its goal of conserving the original source character for future

[8] Editor's note: Predefined paths were, however, often a typically colonial strategy to convert a living site into a controllable 'heritage site' for tourist consumption (compare the contribution of Falser in this volume for the process of the making of the 'Archaeological Park of Angkor'). Another question is what kind of story is told (or not told) in virtual guiding systems (compare Chermayeff in this volume) and who has access to or rests excluded from this information.

[9] The future of the destroyed Bamiyan Buddha figures has invoked various total reconstruction ideas, as well as a laser-light art concept. The discussion of these proposals mainly took place through various global platforms on the Internet, occasionally reflected in traditional media on the local level in Afghanistan. The distinction between action proposals and factual decisions too often communicated unclear and different attitudes towards the reality on the ground and ways the various interconnected 'media realities' could be experienced.

generations, the importance of immaterial aspects related to monuments and culture in general has been understood as equally important.[10] However, there are still methods and standards lacking in these aspects of heritage values for daily conservation work.

Within a multidisciplinary approach at RWTH Aachen University some of these issues are explored from a socio-technological viewpoint. The research project Virtual Campfire examines, within the Excellence Cluster UMIC (Ultra High Speed Information and Communication), how far current developments in collaborative work on multimedia artefacts and web-based learning approaches are applicable to cultural heritage management scenarios. Storytelling, as a means of delivering explicit and implicit knowledge, is examined here as a tool for promoting awareness of the different values of cultural sites by actively addressing the needs of both expert and non-expert users (Spaniol et al. 2008).

In the case of the destroyed Bamiyan Buddha figures and the future treatment of the fragments, advanced documentation techniques facilitate the needs arising from practical preservation and restoration works. Furthermore, the precise and accurate (digital) documentation may serve as a primary source in itself if the original material is lost due to human or environmental factors. Ethical components also have to be considered since the general discussion on physical reconstruction is ongoing (UNESCO 2012) and still far from being decisively resolved.

A 3D virtual environment may serve as a means of communication that addresses the psychological need of those who directly suffered from acts of destruction. The methodological approach has to reflect both technological and epistemological questions, be aware of its potentials, and, even more importantly, of its limitations. Based on virtual models (Fig. 13a, b) it is possible to study and compare in detail the concepts for technical conservation measures in the future prior to their execution and without disturbing the original physical substance and the *genius loci* further.

Furthermore, we are convinced that the true outstanding of cultural places of the world can only be preserved in the full richness of their authenticity if their meaning, nature, and social relation is understood and maintained intact. Because in local regional conflicts heritage sites are too often used by all parties to claim the exclusive right to an absolute truth (as is the case currently with the World Heritage Site of Preah Vihear between Thailand and Cambodia) it may be understandable to ask whether the concept of universal values (Falser 2011) is still adequate in a globalized world with different believes, attitudes, and habits.

[10] In this field UNESCO has initiated the Convention on Safeguarding of the Intangible Cultural Heritage (2003) and the Convention on Protection and Promotion of Diversity of Cultural Expression (2005).

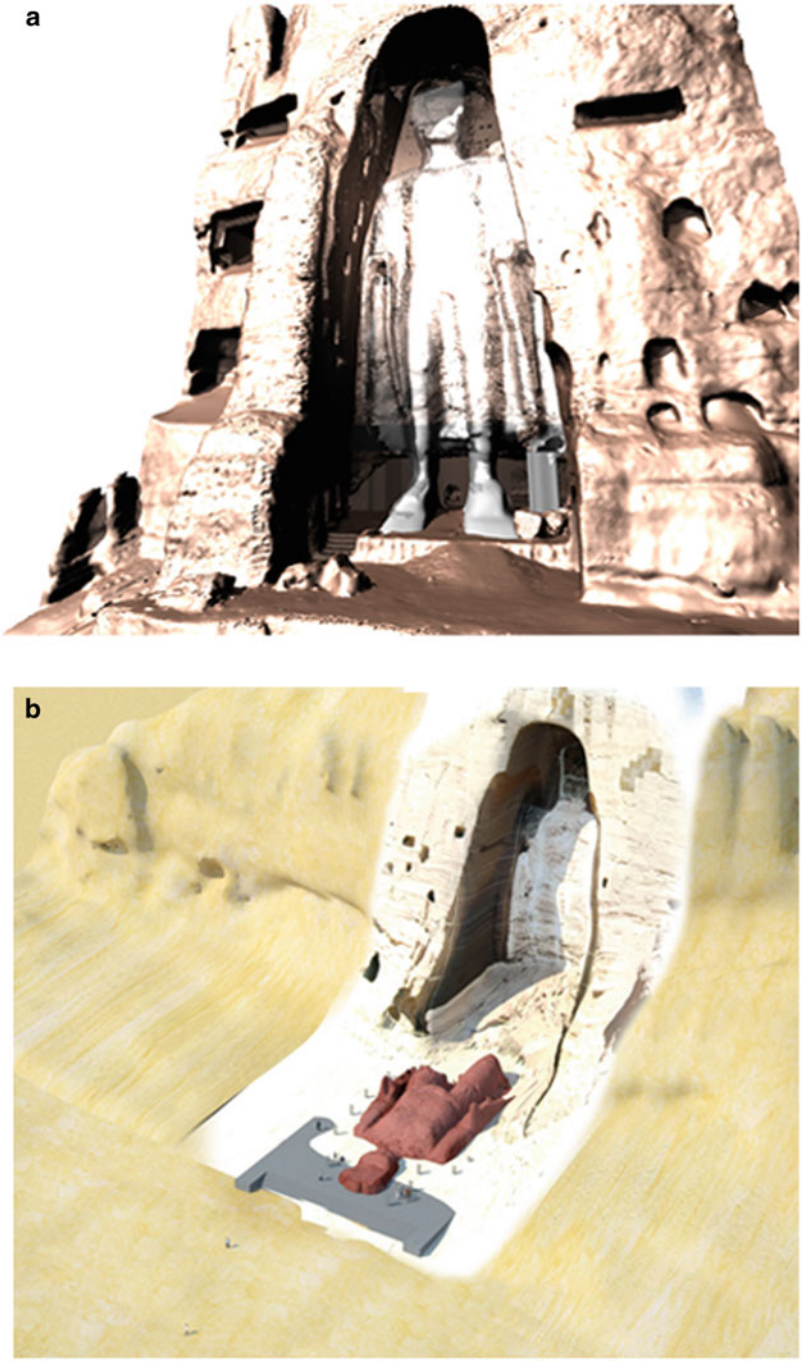

Fig. 13 (**a**, **b**) Various proposals for a future treatment of the Buddha remains. Partial physical reconstruction of only the lower parts of the thirty-eight metre Buddha and safekeeping the dust and rubble from the fifty-five metre Buddha in direct vicinity of the large niche (acdc 2010)

However, it may be appropriate to take some time to return to a moment when the *tour d'horizon* started:

> Those who know themselves
> and others will recognize here, too,
> that the Orient and the Occident
> can no longer be separated. (Goethe 1819, West-east Divan)

Acknowledgements This work is supported by the German National Science Foundation (DFG) within the research cluster UMIC-Ultra High Speed Mobile Information and Communication established under the excellence initiative of the German government. We thank our colleagues Ralf Klamma and Mathias Jarke in the Information Science Department at RWTH Aachen University for many fruitful discussions. We also thank Prof. Minoru Inaba of the Institute for Research in Humanities at Kyoto University for making the contour line drawing of the giant Buddha available.

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Virtualizing the Temple of Bayon

Olivier Cunin

Abstract The Bayon temple—located at the centre of Angkor Thom and built by king Jayavarman VII (1181–c.1220)—has been virtualized several times since the 'rediscovery' of the Angkor site by Europeans in the middle of the nineteenth century CE. Some of this 'virtualization' has involved artistic interpretations of the Bayon, while others were actual archaeological reconstructions based on knowledge of the monument at that time. The layout of the Bayon is its first virtualization, and its evolution from the end of the nineteenth century to the 1960s, shows the complexity and the difficulty met by the explorers and architects who have tried to depict the temple. This paper discusses the recent virtualization of this complex Khmer temple as a three-dimensional model based on a specific context of the building's archaeological history. Like classical archaeological reconstruction drawings, the main purpose of this kind of virtualization of ancient buildings using 3D modelling is the depiction of a monument in its original shape before deterioration. In the specific case of the Bayon, this purpose poses several challenges linked with the site's complex architectural history. It is not just one archaeological reconstruction but rather a series of reconstructions that are needed in order to depict the different chronological incarnations of this temple.

This paper summarily raises two points about the generalization of the 3D model for the archaeology of ancient buildings: Because an archaeological reconstruction is not definitive but represents our current understanding of the monument based on a synthesis of architectural and archaeological studies, the question of rendering 3D archaeological reconstructions for the public has to be reassessed. On the other hand, the utilization of the CAD system to elaborate the 3D models of these archaeological reconstructions can be a genuine research tool used to validate hypotheses and conduct new investigations, not just produce images for communication.

Keywords 3D modelling • Cultural heritage • Bayon • Banteay Chhmar • Angkor

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Introduction

This paper introduces a brief contribution on the use of three-dimensional virtual models in the architectural and archaeological study of the Bayon temple of Angkor Thom (Fig. 1). This temple dates from the late twelfth and early thirteenth centuries CE. The Bayon gave its name to a style common to a complex of Buddhist monuments scattered across a large territory, including current-day Cambodia and a portion of Thailand. The most important concentration of monuments in the Bayon style are found in the Archaeological Park of Angkor, with the temples of Ta Prohm, Preah Khan, and Bayon considered the most important. Supposedly built during the reign of Jayavarman VII (1181 to c.1220 CE), the Bayon temple, primarily due to its numerous face towers, is indisputably the flagship monument and the most intriguing temple attributed to this sovereign.

Once the Archaeological Park of Angkor was inscribed on the UNESCO World Heritage List in 1992, conservation and restoration activities on the Angkor temples flourished. During a twenty-year break, dominated by the tragic events of the Khmer Rouge era followed by the occupation of Cambodia by neighbouring Vietnam, conservation and restoration activities were at a standstill. The inscription of Angkor to World Heritage status, and the Khmer art exhibit organized at the Grand Palais in Paris, which moved to the Washington National Gallery of Art later the same year, revived interest among the general public in these monuments and in Khmer art, concomitant with renewed research activities on the site. This was the background for the 1997 archaeological three-dimensional reconstruction of the northern library of the Bayon within the framework of our architectural study (Fig. 2). This reconstruction was completed at the *Centre de Recherche en Architecture et Ingénierie* (Research Centre in Architecture and Engineering) at the Nancy Architecture School. This was a first approach to Khmer architecture, which was followed a year later by the modelling of the rest of this temple within the same institutional framework.

For many years, the Bayon remained accessible only through architectural, measured drawings and virtual reconstruction. In our case, it was in 2000, after an on-site visit in 1999, that a 3D model of the entire Bayon was completed. Since then, other archaeological reconstructions have been designed: Banteay Srei[1] in 2008, the Preah Khan of Angkor in 2009, and Banteay Chhmar[2] in 2010.

[1] A temple dating from the mid-tenth century CE located some thirty seven kilometres to the northeast of Angkor.

[2] Preah Khan and Banteay Chhmar are Buddhist temples, contemporaneous with the Bayon. Editor's note: Compare Cunin's virtual models of the Preah Khan temple in Chermayeff's contribution in this volume, and his model of the Banteay Chhmar temple in Sanday's essay.

Fig. 1 View of the Bayon temple from its north-western corner (Cunin 2002)

Fig. 2 3D reconstruction of the Northern Library of the Bayon temple (Cunin 1997)

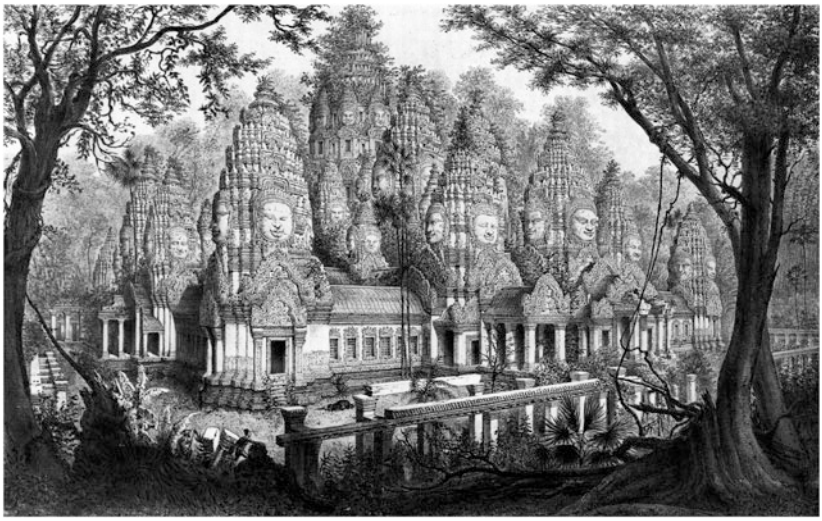

Fig. 3 Artistic image of the Bayon by Louis Delaporte in 1873 (Source: Garnier 1873, vol. 1, part 2, plate IX)

The Temple of Bayon: A Never-Ending Reconstruction

The completed reconstruction of the Bayon was not the first one made, nor will it be the last.[3] A four-dimensional puzzle, it is most likely that, due to the present day lacunae and its geometric and symbolic complexity, the reconstruction of this temple will be a never-ending process.

Carrying out a measured drawing of the plan and elevation of a monument is already a means of virtualizing it. In the case of the Bayon, a first graphic description was undertaken in 1866 during the expedition headed by Commander Ernest Doudart de Lagrée who was assigned to explore the valley of the Mekong.[4] Louis Delaporte, who took part in the mission as an artist/draughtsman, drew the first reconstructions of the Bayon (Fig. 3). Delaporte's illustration is a romantic image and a reconstruction but does not depict the real condition of the Bayon when he saw it. Indeed, old photographs taken in the beginning of the twentieth century during Dufour's mission[5] clearly show that a large part of the wall of the outer gallery was still standing before

[3] Among these reconstructions are those of Alessio Bortot and Nicola Sartorato, which formed part of their architecture degree at the University Institute of Architecture Venice, Italy, in 2005.

[4] Francis Garnier published these documents in 1873 in the *Voyage d'Exploration en Indochine*, which formed the report of this mission. Editor's note: Compare Baptiste's essay and his discussion of Delaporte's drawings as one participant of this mission.

[5] The pictures of the outer and inner galleries of the Bayon were taken during two campaigns in 1901–1902 and 1904.

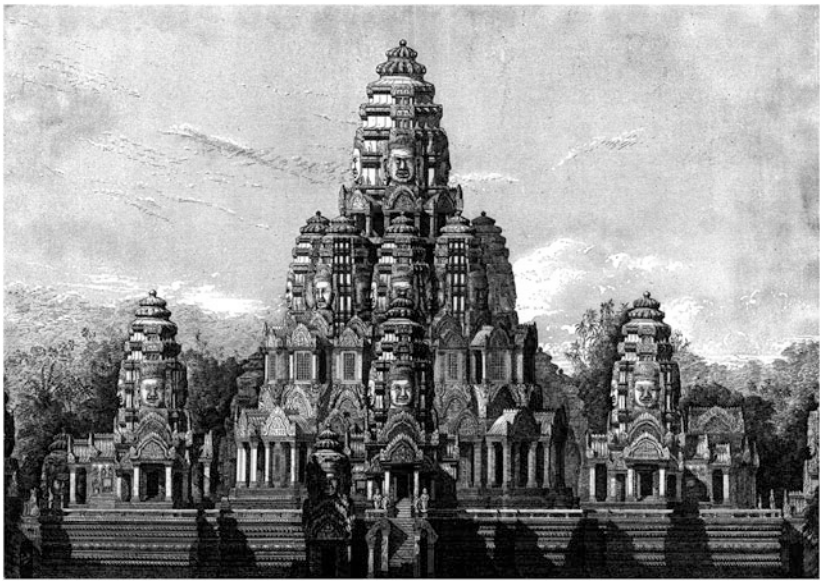

Fig. 4 Archeological reconstruction of the western elevation of the Bayon by Louis Delaporte in 1880 (Source: Delaporte 1880, 177–78)

restoration work was later carried out by the Angkor Conservancy. On the other hand, the representations of the corner galleries of the inner enclosure are false and did not reflect the reality of the monument at that time. In 1873 Delaporte undertook new explorations in Cambodia, this time focusing on Khmer monuments. He then described the monument and drew a more detailed plan of the temple with new reconstructions (Delaporte 1880) (Figs. 4, 5a).

Due to the ruined condition of the monument and the vegetation entangling it these first graphic descriptions occasionally included mistakes. The Albert Tissandier plan, published in 1896 (Tissandier 1896, 29, 33), was confronted with the same issues of legibility due to the condition of the temple (Fig. 5b). This plan was used in Étienne Aymonier's 1904 publication (Aymonier 1904, 148, 149). It was only after the 1910 publication of photographs of the Bayon bas-reliefs taken during the Henri Dufour and Charles Carpeaux mission that a new site plan of the monument was made by H. Dufour and was used as a template for subsequent studies (Fig. 5c).

Until the mid 1960s, the restoration activities undertaken at the Bayon by the Angkor Conservancy since 1908 did not include any new measured drawings of the monument after that of H. Dufour. In 1965 and 1966 the Angkor Conservancy carried out a new measured drawing campaign, which was spearheaded by Jacques Dumarçay (Fig. 5d). Bernard Philippe Groslier initiated the publication of these measured drawings in 1967 (Dumarçay 1967). In 1973 a monograph of the monument was added to this publication, comprehensively describing the building whilst

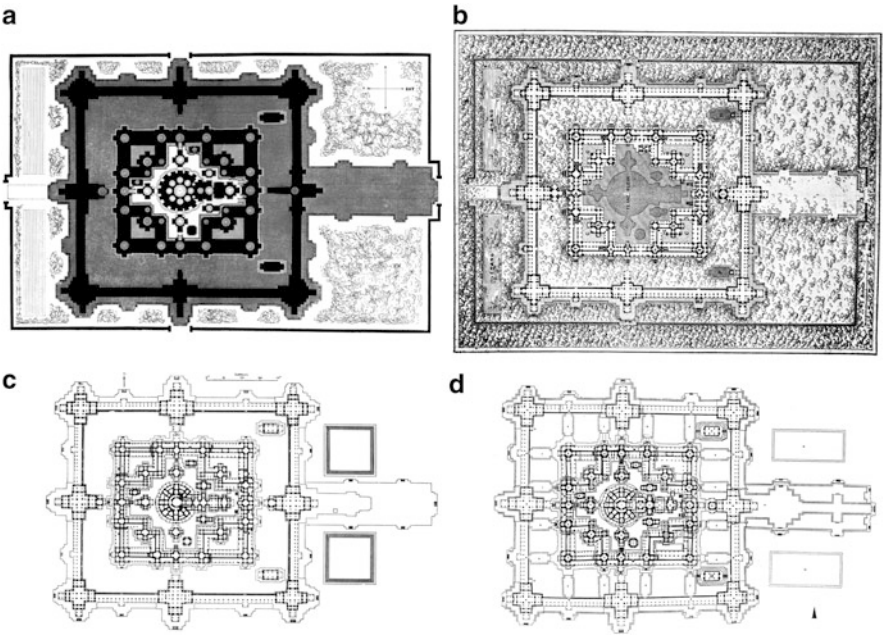

Fig. 5 Layouts of the Bayon drawn by (**a**) Delaporte (1880), (**b**) Tissandier (1896), (**c**) Dufour and Carpeaux (1910), (**d**) Dumarçay (1967) (Sources: (a) Delaporte 1880, 162–3, (b) Tissandier 1896, 29, (c) Dufour 1910, (d) Dumarçay 1967, plate III)

establishing a relative chronology of its construction. This later publication corrected and brought together numerous additions to Henri Parmentier's previous studies (Parmentier 1927, 1936), the latter was summarized by Georges Cœdès in 1943 (Cœdès 1943).

In 2003, the Computer Vision Laboratory, Ikeuchi Lab at Tokyo University started the Bayon Digital Archive Project in cooperation with the Japanese Government Team for Safeguarding Angkor (JSA).[6] The motivations of this project were as follows: (a) to develop new sensors for measuring the regions of the Bayon that cannot be observed by conventional sensors; (b) to develop modelling techniques for a large data set; and (c) to preserve this temple in fine detail. This laboratory has developed various types of laser range sensors (climbing sensor, flying laser range sensor etc.) and modelling techniques (fast alignment, parallel

[6] JSA started a restoration and conservation program of the Bayon in 1994 and have continued their efforts since 2006 under the name JASA in association with the national authority APSARA, which is in charge of the management of the Angkor Archaeological Park.

Fig. 6 Results of the 3D laser scanning of the Bayon temple, Ikeuchi Laboratory (Japan 2007) (Ikeuchi Laboratory—Institute of Industrial Science. University of Tokyo, Japan 2007)

merging etc.) to obtain 3D models of the Bayon (Fig. 6). The result is a new architectural survey, and this 3D model can be employed as a 'digital copy' of the current condition of the monument.[7]

The virtual model of the Bayon temple that we designed between 1997 and 2000 aimed at representing the architectural history of this monument as published by J. Dumarçay (Fig. 7). The goal was to prove the hypothesis of the author based on the architectural measured drawings designed under his supervision (Cunin 2000). Graphic two-dimensional representations of the architectural history of the temple were rare and only his written description was used as the reference for studies on this temple. During the three-dimensional modelling of Dumarçay proposed chronological incarnations of the Bayon, some inconsistencies appeared. They were

[7] Editor's note: Cunin's virtual model of the temple (in relation of the Japanese results which depict the temple in one specific moment in time) discusses actual and ancient buildings typologies of the Bayon-style temples at Angkor. This aligns with Nguonphan's (this volume) generic reconstruction of the decorative patterns of the classical period of Angkorian temples. Toubekis/Jansen's solutions in this book, however, create models as communicative tools in the decision-finding process of restoration. Gruen's surface-oriented models, on the other hand, focus on the overall image of the temple structures. How the value of Angkorian tempels as living social entities of the local stakeholders can be part of all these undertakings, seems to be an unsolved or not even posed question. From this point of view, the dichotomy between the virtual models in their 'archaeologizing' effects on the one side and the rising appreciation of the temples as 'living heritage' on the other, is still valid.

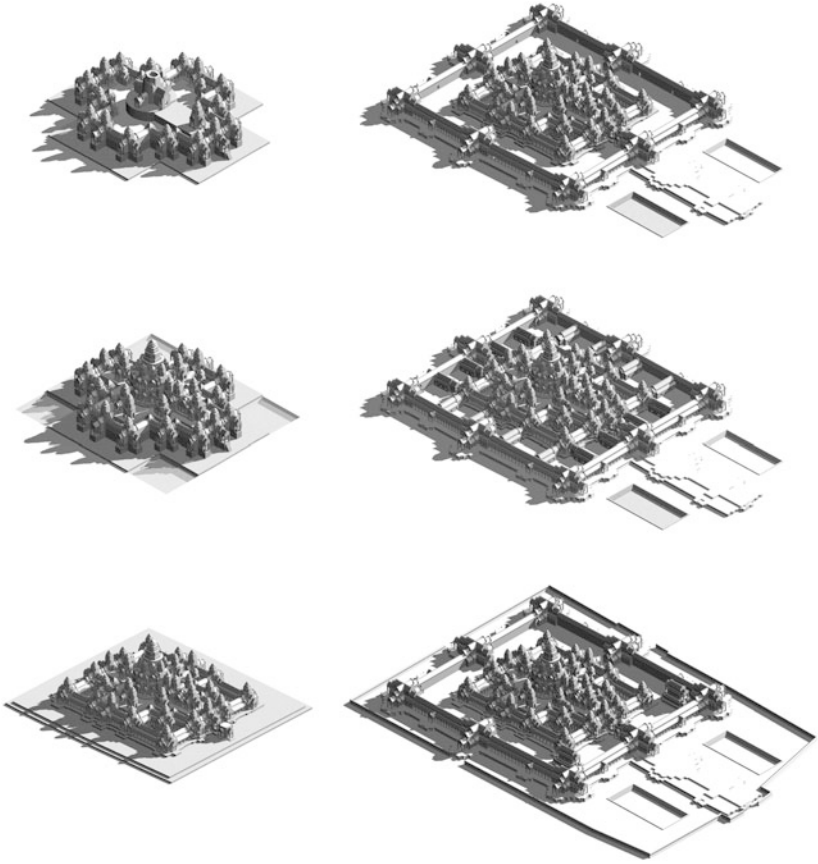

Fig. 7 Extract from the three-dimensional reconstruction based on Jacques Dumarçay's hypothesis (Source: Cunin 2000)

difficult to conceive when establishing the two-dimensional documentation published at the time. Subsequently, the relevance of some of the commonly admitted hypotheses on the architectural history of the Bayon since the publication of Dumarçay's works, were challenged. This was the background for the 2000 research programme *De Ta Prohm au Bayon* (From Ta Prohm to the Bayon), which formed part of my PhD in architecture research. The research initially focused on the Ta Prohm temple in order to develop an analysis methodology to apply to the whole of the Bayon-style monuments. Inspired by experiences from the archaeology of the construction set up in Europe in the early 1980s, the applied methodology was divided into three categorized studies of these monuments: their masonry, the stylistic evolution of their decor, and the magnetic susceptibility of their constitutive sandstone blocks. A summary of this three-pronged approach enabled the development of a chronology for each studied temple and an overall chronology for the Bayon-style monuments (Cunin 2004).

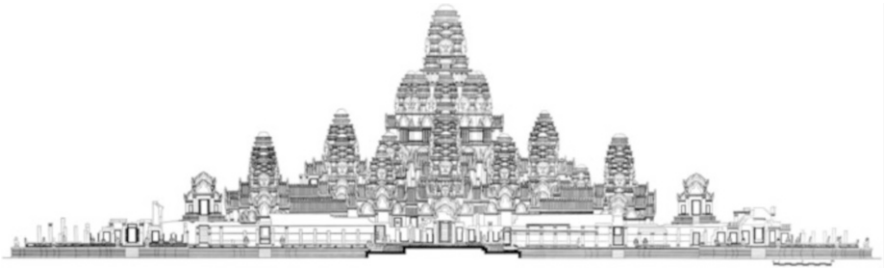

Fig. 8 Reconstruction of the eastern façade of the Bayon as suggested by Dumarçay (EFEO, 1967). The author decided not to reconstruct the outer gallery superstructures. Yet, in his 1973 publication, Dumarçay suggested faceless tower roofing on the pavilion of this gallery (Dumarçay and Groslier 1973, 26) (Source: Dumarçay 1967, plate LXVII)

Fig. 9 Reconstruction of the eastern façade of the Bayon including the new hypothesis concerning the reconstruction of the outer gallery (Source: Cunin 2004)

A review of the architectural history of the Bayon was suggested throughout the research. The issue regarding the reconstruction of these lacunae, in particular at the outer gallery superstructures, was raised again. From the initial late nineteenth-century plans right up to Dumarçay's studies, only one hypothesis regarding the reconstruction of the faceless tower roofing of this outer gallery pavilion had been advocated. Based on this hypothesis, fifty four face towers were counted at the initial construction stage of the Bayon (Fig. 8).[8] This figure is the one mentioned in the publications on Angkor intended for the general public and by the accredited guides working in Siem Reap. Our investigations on the stone storage areas of the Bayon since its clearing in the early twentieth century and a comparative study with the third enclosure of the Banteay Chhmar temple,[9] led us to suggest a new reconstruction of the temple with ten more face towers[10] (Fig. 9). All of these new reconstruction hypotheses have been

[8] This figure includes the five Angkor Thom monumental face gates, most likely because Cambodians consider the Bayon and Angkor Thom a unique entity.

[9] This is a Bayon-style monument with face towers, located in the Banteay Meancheay province in Cambodia, see the contribution of Sanday in this volume.

[10] A total of sixty-four face towers, of which fifty-nine are from the Bayon.

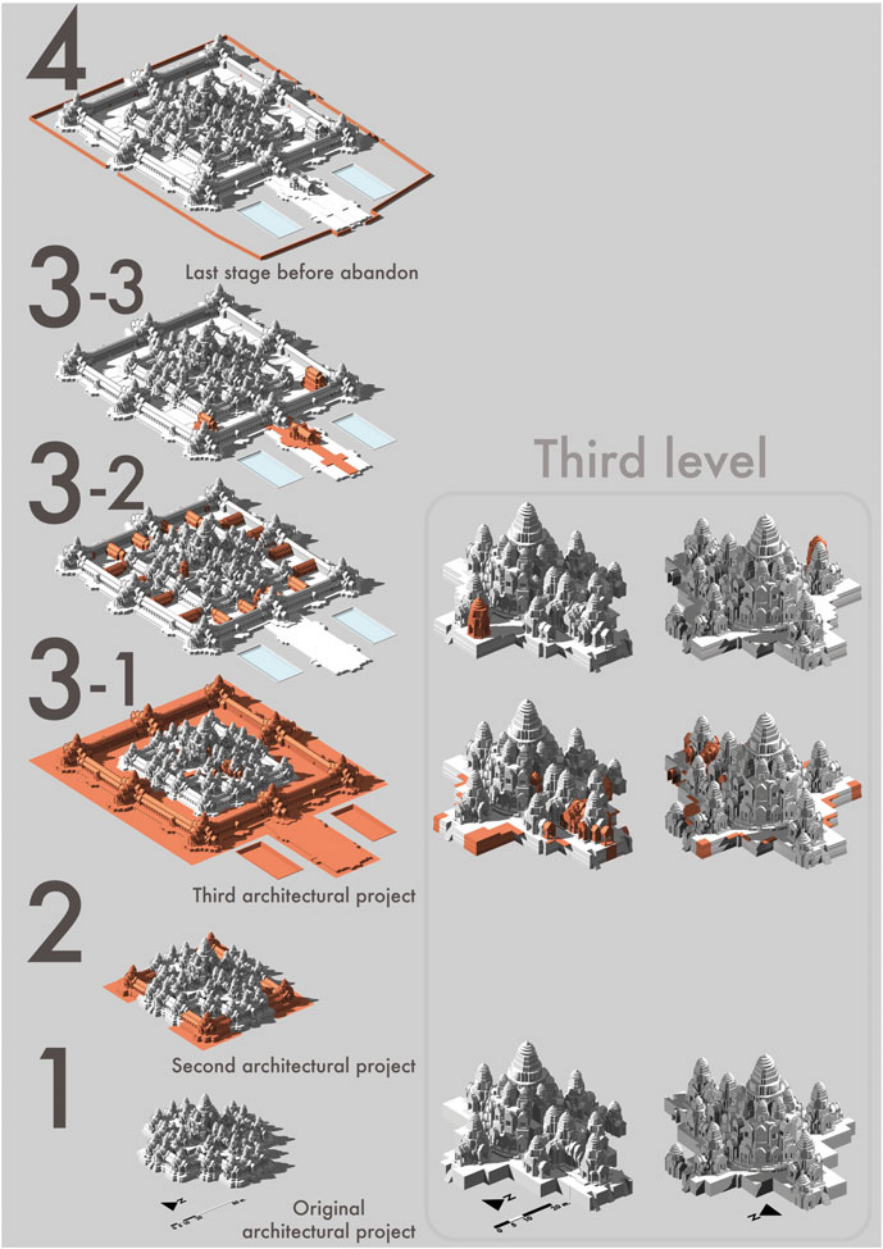

Fig. 10 3D reconstruction of the relative chronology of the Bayon (Cunin 2005)

represented on a three-dimensional model published in 2007 as part of a collective work dedicated to the Bayon (Cunin 2007). These reconstructions adapted our previous virtual model of this temple (Fig. 10).

Thoughts on the 3D Reconstruction Regarding the Study of the History of Bayon-Style Monuments

The 3D reconstruction of the Bayon did not initially follow an archaeological in situ approach, but the 2009 reconstructions of Preah Khan in Angkor and Banteay Chhmar in 2010 were an opportunity to experiment with this approach for architectural and archaeological studies. These two monuments presented an additional challenge to the reconstruction of the Bayon. As is the case of all the Bayon-style monuments, these two temples are actually the result of several construction stages as well as their abandonment as religious places around the sixteenth century, which caused substantial damage due to a lack of maintenance. Nevertheless—unlike Bayon—a comprehensive measured drawing of these two monuments is not available. Thus, their standing structures have not yet been properly documented. This was compensated for when setting up the three-dimensional (Fig. 11) vocabulary of architecture for the Bayon style in association with the site plans that were used as a basis for our work. In addition, photographic documentation of their remnants was carried out with the cornices used as the level for the modelling. We were therefore able to omit undertaking new traditional measured drawings, having already digitalized them with a 3D laser scanner.

Despite the measurements approximation, this methodology completely met our goal of achieving the archaeological reconstruction of these two temples (Figs. 12 and 13) in order to represent their architectural history more accurately. The maximum margin of error measured using this modelling methodology was approximately fifty centimetres on the entire height of the standing sanctuary towers. In addition, this modelling approach brought out new issues in the reconstruction and the history of these two temples, leading us to enrich our knowledge and present new hypotheses. Finally, the experience with the virtual model of the Bayon spurred us to structure the three-dimensional models of the Preah Khan and Banteay Chhmar and to facilitate their evolution. Thus, as demonstrated in the case of the Bayon, the archaeological data of a monument evolves according to new hypotheses and archaeological findings, and therefore the archaeological reconstruction cannot, by its very nature, be final and can only reflect the acquired data at the time of production.

Thus, the computer conception tools used to carry out an archaeological reconstruction may bring more to it than the third dimension, since when they are integrated in the scientific approach to a monument they allow for a confirmation or contradiction of reconstruction hypotheses that, using traditional architectural drawing representations, would have taken much longer. Moreover, the three-dimensional modelling process of the existing and reconstructed portions of a building may bring to light new issues which two-dimensional representations may not have been able to uncover.

Because of their impermanent nature, three-dimensional archaeological reconstructions raise questions about their presentation to the general public. The rendering tools in computer-generated pictures, inclusive or independent of 3D

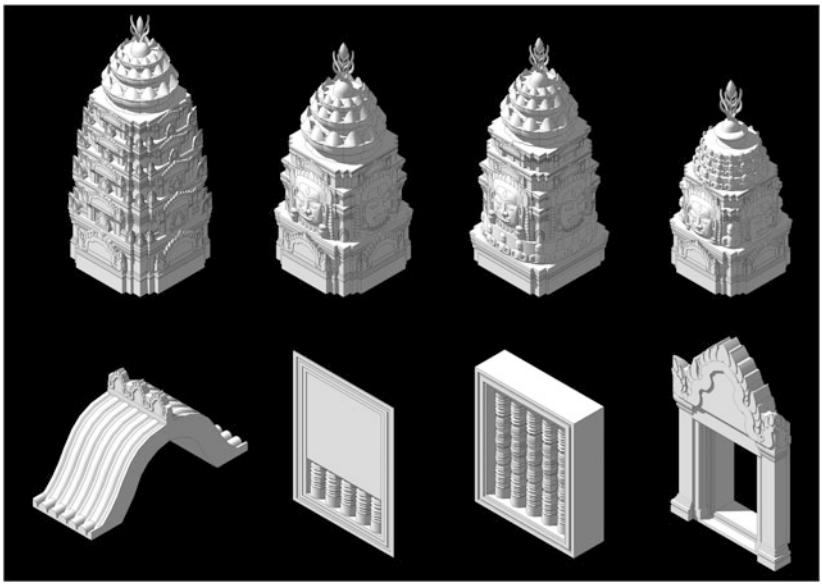

Fig. 11 Extracted from the vocabulary of architecture used for the reconstruction of Banteay Chhmar (Cunin 2010)

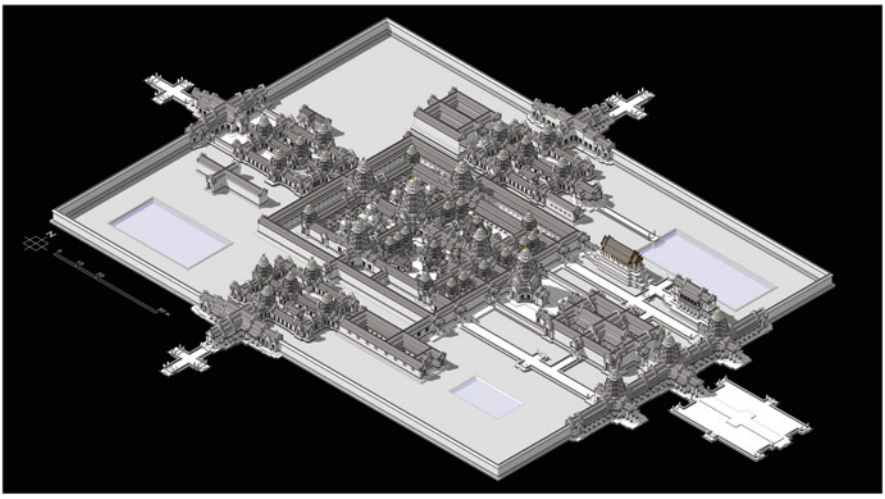

Fig. 12 Second version of the archaeological reconstruction of Preah Khan (Cunin 2010, sponsored in 2009 by the World Monuments Fund)

modelling software, often offer several representation modes from the wire frame to the photo-quality rendering. The use of computer-generated pictures for archaeological reconstructions seems to show a predominance of the photo-quality rendering. This same representation mode is shared with the reconstructions of this monument, which we qualify as 'artistic'. The latter is inherently more visually

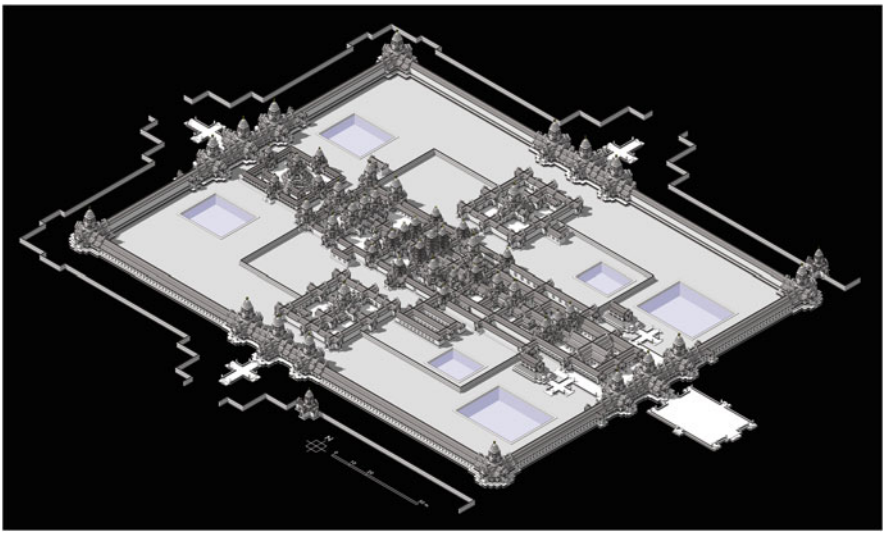

Fig. 13 First version of the archaeological reconstruction of Banteay Chhmar (Cunin 2010, sponsored in 2010 by the Robert Charitable Trust in collaboration with the Global Heritage Fund)

pleasing, but usually scientifically erroneous. The aim is to produce a 'nice picture' and, as far as Angkor is concerned, examples of this type of representation are often seen on some television documentary films, which attempt to reconstruct the site during its heyday. Although they are sometimes produced with the scientific collaboration of archaeologists, the limitations of this type of production are that they tend to present hypotheses to the general public who, with a lack of in-depth knowledge about the reconstructed monuments, may think that what they are looking at is, beyond a doubt, the condition of the monument before its ruin. Once this problem was assessed (although this is not the object of our research) it was decided that the archaeological reconstructions should look similar to a traditional architectural drawing in axonometry or perspective, so that they can be understood as abstractions and not as pictures of a hypothetical past.

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Part V
Restoration and Interpretation: Of Virtual Models and Living Communities

Between On Site-Conservation and Scientific Computing: A Future for the Twelfth-Century Banteay Chhmar Temple Complex

John Sanday

Abstract The twelfth-century Buddhist monastic complex of Banteay Chhmar is still a mystery to travellers and historians alike. It is in a remote location about 160 km northwest of the World Heritage Site of the historic city of Angkor and was built by King Jayavarman VII. It follows a similar layout to his great temple complexes of Preah Khan and the Bayon, with which it shared the unique features of face towers and a bas-relief depicting local life and legends. Set in an arid zone where farming is the principal occupation of its 13,000 inhabitants, the US-based Global Heritage Fund deemed it as meeting the criteria for a potential UNESCO World Heritage Site within an underprivileged community and, in collaboration with the Cambodian Ministry of Culture and Fine Arts and the Department of Computer Science (IWR) of the German University of Heidelberg, has set about repairing and conserving this unique monument, using both traditional conservation philosophy and state-of-the-art virtual restitution with the goal of training a local team in conservation technology and site management, and providing employment and a source of revenue to the community.

Keywords Architectural conservation • Reconstruction • Scientific computing • Global Heritage Fund • Banteay Chhmar

The Historic Context

Banteay Chhmar is one of the crowning glories of King Jayavarman VII's reign (1181-c.1219 CE). This Khmer king was a prolific builder, crisscrossing his dominion with roads, founding hospitals to care for his subjects, and creating

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Fig. 1 Prasat Ta Nem satellite face tower Shrine West (John Sanday)

magnificent temples to honour his family. But Banteay Chhmar is nonetheless something special. An architectural *tour de force*, it has the architectural refinement and size of a major metropolitan temple in the capital at Angkor; yet Banteay Chhmar is not in the capital (Figs. 1 and 2). It lies a considerable distance away, 160 km northwest of the capital in a remote region that has been described as one of the most desolate places in Cambodia. Even today, the reasons for its location in present day Banteay Meanchey Province are unclear. Historians question its location, as it is located in a very arid zone and has neither rivers to supply the temple complex and its inhabitants with water, nor is there a known road that provided direct access from Angkor. Nevertheless what remains of the complex today makes it one of Jayavarman VII's most significant structures, aligning it closely with the Bayon in Angkor. The notional reconstruction of the central temple complex by French architect Oliver Cunin (compare Cunin's contribution in this volume) provides a bird's-eye view of the main temple, measuring 700 m by 750 m of an otherwise extensive, predominantly Buddhist temple complex similar to those that Jayavarman VII was building in Angkor. The computer model (Fig. 3) reconstructs the original form of the temple proper with its forty eight plus face towers, numerous individual shrines, and the extensive bas-relief gallery.

Banteay Chhmar is a forgotten legend that over the centuries has quietly metamorphosed into a hidden pile of stone blocks. Beneath these stone blocks on the outer periphery of the temple proper lies buried most of the remnants of the 750 m long set of bas-reliefs, of which only twenty percent are standing today

Fig. 2 A map layout of the Banteay Chmar temple (Global Heritage Fund)

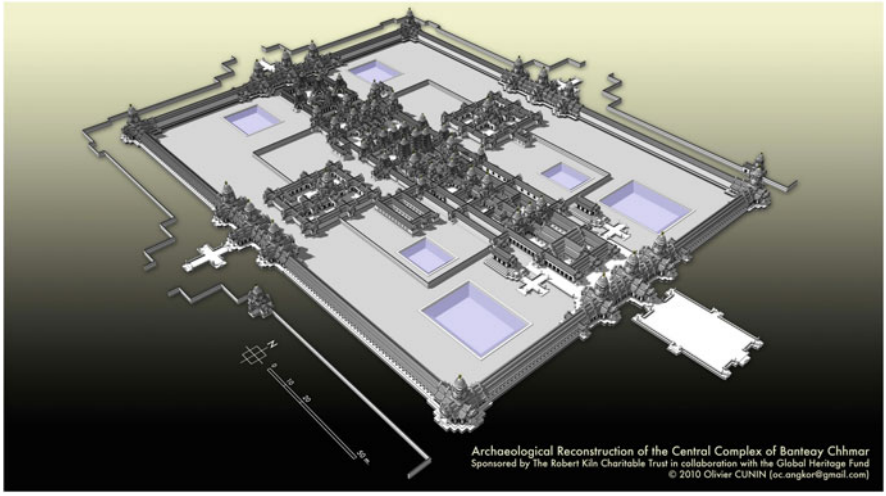

Fig. 3 Bird's eye view reconstruction of the Banteay Chmar temple (Global Heritage Fund, Olivier Cunin)

(Fig. 4). These bas-reliefs depict local lifestyles typical of those found in this northern sector of the Khmer Empire. There is no real sequence to the imagery of the bas-reliefs; they follow one another as a series of unrelated historical events and myths. For example, in one vignette the stories of local legends, such as the slaying

Fig. 4 The buried Avalokiteshwara bas reliefs, Southwest Enclosure Wall III (Global Heritage Fund)

Fig. 5 Face tower, measurements on site and debris (Global Heritage Fund)

of the demon Balu are told, followed by a fierce battle or a scene where heads of the vanquished are being offered to the victors. Another major feature of the Banteay Chhmar Complex is the face towers, which are similar to those found in the Bayon (Fig. 5). In fact, it is thought, according to research, that the face towers of Banteay Chhmar provided the prototypes for some of those in the Bayon. Earlier research carried out by Olivier Cunin and published in a book entitled *Face Towers of Banteay Chhmar* with photographs by Baku Saito (published in Japanese in 2005)

provided an interesting record of these unique face towers and their possible influence on those of the Bayon.

Today Banteay Chhmar is somewhat of an enigma, lying close to the northwest border between Cambodia and present-day Thailand. Its location, in what is best described as an arid zone raises many unanswered questions. In contrast to the temple complex of Angkor, which was strategically placed close to the great lake, the Tonlé Sap, and other water sources in the nearby Kulen hills, as well as the vast network of Angkorian roads linking the other great sites of the period, Banteay Chhmar had neither a plentiful water source, nor was it linked directly by a road.

Historians are still debating the reasons for its location and founding, and it is hoped that the extensive research and investigation of the joint collaboration between the Ministry of Culture and Fine Arts (MCFA) and Global Heritage Fund (GHF) will produce some answers to the many outstanding questions.

The Global Heritage Fund Banteay Chhmar Project

To understand this historic Buddhist monastic complex, it is important to compare it to the major Khmer sites in Angkor, since their impact on the GHF Banteay Chhmar team was essential to the development of the GHF Banteay Chhmar Conservation Training Project. Their historical influence on Banteay Chhmar will also soon become apparent. Prior to the commencement of the project in Banteay Chhmar, the key members of the new team had worked with me in Angkor for over a decade, particularly on the twelfth-century Buddhist monastic complexes of Preah Khan and Ta Som with the World Monuments Fund. It was here that we learnt about the history and structure of the many religious temple complexes built by Jayavarman VII. It was here that we also developed appropriate conservation and structural technology for the repair of structures that threatened collapse. In Preah Khan and Ta Som we began to understand and were able to test the philosophies of conservation and the significance of maintaining the marks of the passing of history on these historic sites. It is essential not to falsify the history of a structure through restoration or reconstruction but to present it as it is found, and to ensure that the structure as found is only consolidated and maintained for future generations to witness (Fig. 6).

My first visit to Banteay Chhmar in the late 1990s lived up to my first visit to Angkor in 1989, when the temple complexes were completely overgrown and neglected. From what we could distinguish in the dense undergrowth it was apparent that Banteay Chhmar was a partial ruin and many structures were threatening to collapse. Indeed, some of the structures were defying the laws of gravity and it was hard to determine how many of these structures even managed to remain standing. Most of those still standing were held together or supported by their principle destroyers the *ficus* or the *fromagère* trees, enormous towering *tetrameles nudiflora*.

So where to begin?

Fig. 6 Defying the laws of gravity, arches of the temple before collapse (Global Heritage Fund)

It is here in Banteay Chhmar that GHF and I saw our newest challenge and in collaboration with the MCFA we embarked on GHF's first major five-year conservation training programme in Cambodia using GHF's 'Preservation by Design' philosophy to begin to unravel the Banteay Chhmar puzzle. The thrust of GHF's involvement in Banteay Chhmar, is to train a team of young professionals and a work force from the local community to set up a broad-based conservation unit capable of monitoring and maintaining both Banteay Chhmar and the other important monuments in the northern region of Cambodia for the MCFA (Fig. 7).

This involves ongoing training at site, in survey and research as well as specific training in stone conservation and structural consolidation. We are teaching simple, appropriate technology along with maintenance and management skills—skills that the local community will foster in the long-term programme of conserving and maintaining their heritage.

Recording the site is always the first priority: Selecting a place to start and then carefully and systematically measuring and identifying the stones. In this case, since the plan was to develop collaborative activities with the MCFA, the southeast sector of the East Enclosure Wall III, containing a standing section of the bas-reliefs, was selected. Recording, assessing, and designing, followed by consolidation and repair, are the typical procedures. Drawings are made to scale on graph paper in meticulous detail and later transferred into computer software giving enormous flexibility in future research and development. Careful topographical measurements are taken to establish the structural stability of the bas-relief walls and a careful assessment of the condition of each individual stone making up the bas-relief wall is carried out.

Fig. 7 Training of stone masons on site (Global Heritage Fund)

Digitization of an Archaeological Site

At this point a new and very sophisticated recording process takes place. Over several years, I have been in discussion with the Applied Mathematics Department (IWR) at Heidelberg University to design software that assists in the reconstruction of fallen stone monuments. With the commencement of the GHF Banteay Chhmar Conservation Training Project, the ideal opportunity to develop such a programme was conceived and is now underway at site. A very sophisticated 3D digital camera and dedicated software was sent by the IWR along with a team of postgraduate students to begin a research programme to "solve John's puzzle"—as one of IWR's leading professors put it. A stroke of good fortune was that a former architectural student from the department of archaeology at the Royal University of Fine Arts, Phnom Penh had been selected to join Heidelberg University to undertake a PhD with the IWR on the development of a software programme to reconstruct Khmer monuments. Dr. Pheakdey Nguonphan, who has now completed and received his PhD from Heidelberg University (see his contribution in this book[1]), has joined the GHF Banteay Chhmar team to convert his previous studies into reality. Pheakdey is

[1] Editor's note: Whereas here the scanned stone blocks are used to re-assemble the original structure, Nguonphan's contribution in this volume focuses on the virtual reconstitution of a generic temple structure *à la Angkorienne*. From these different viewpoints, it is interesting to compare the utility of computer modelling.

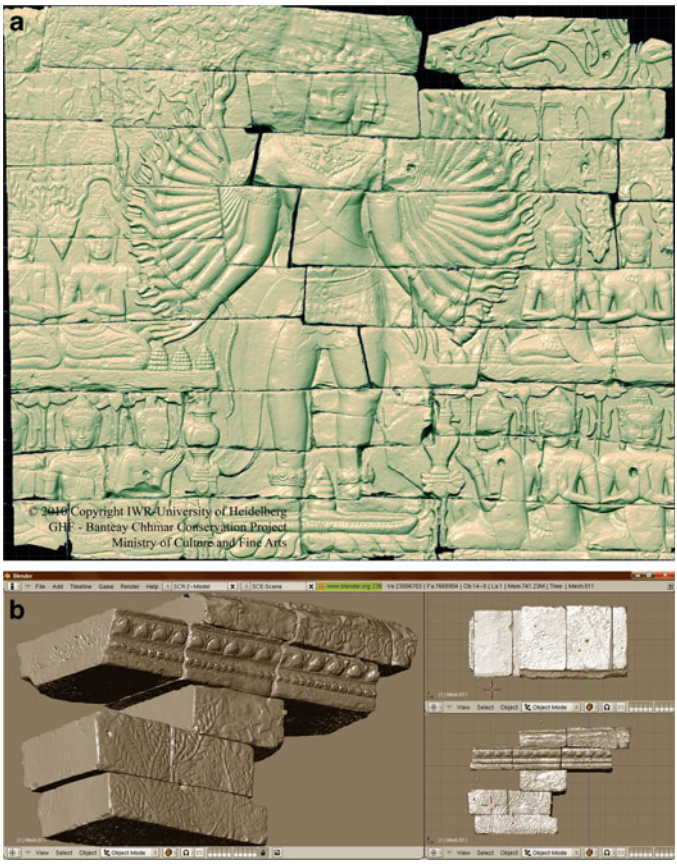

Fig. 8 (**a**, **b**) 3D digital scanning of Avalokiteshvara bas-relief and other wall portions (GHF, IWR University of Heidelberg, Ministry of Culture and Fine Arts Cambodia, 2010, 2012)

leading a group from the GHF team to carry out further research using the Breuckmann 3D digital scanning equipment to record the bas-reliefs and also to set up another project to scan one of the face towers, which was threatening to collapse. The tower was dismantled and the stones are currently being scanned as a research exercise to assist in their reconstruction. This process has entailed the creation and assembly of a 3D scanning system locally at one-tenth the cost of the system brought from Germany and it is now being used with great effect in the reassembly process.

Figure 8a, b show the section of the bas-reliefs that the GHF team has been working on and it was the area selected by the IWR for research and to test and demonstrate the scanning programme. The scanning process has to take place in the dark as the horizontal laser lines are picked up on the camera for calculating the profile of the stones. On average each stone has to be digitally scanned from a different angle at least eight times following its rotation on the purpose-made turntable. The data is then stored in the computer using special software.

Fig. 9 Dismantling of bas relief in the SE sector, preconsolidation prior to removal (Global Heritage Fund)

Their experimental work was started on the southeast sector of bas-relief that GHF is already repairing (Fig. 9). Following its dismantling the bas-relief stones are scanned, after which the data is processed using special software developed for the scanning process. The process produces extremely fine images where often details that the eye cannot perceive at first on the stone itself become apparent in the scanned and processed image.

Stone Repair and Structural Consolidation Work

Stone repair and structural consolidation using minimal intervention is a special skill of the Banteay Chhmar team. Many of the more experienced craftsmen had already worked with me for a decade in Angkor. They are now handing on their skills to a new generation of members from the local community. A particular skill is moving stones by hand using a tripod, blocks, and tackle. Once measured and labelled, stones are identified as to their original purpose and slowly reassembled as each stone is recognized. Columns are matched and the vaults are sorted for eventual partial replacement. As part of GHF's philosophy in its work in Banteay Chhmar, it should be made clear that we have no intention of reconstructing the

Fig. 10 Conservation of bas-relief stone blocks on site (Global Heritage Fund)

temple complex. Our task is to begin to understand its architecture and to undertake specific proto-typical repairs, or in some cases reconstruction. Drawings have been prepared showing the original sections through the galleries and a small section will be reconstructed as an architectural record—nowhere in Banteay Chhmar is there such a structure still standing.

For the first two years all the stone blocks were moved using manpower alone. However, more recently, with the arrival of a mechanical crane, a particular new skill has been developed in Banteay Chhmar. Part of the reason for having to dismantle a section of the bas-relief wall was to remove an extensive root invasion. There was no room for the wall to expand horizontally as the joints were too tight and the growth and expansion of these roots caused the wall to buckle to the point of partial collapse. Coincidentally, the local crane driver had been stationed with the military in Banteay Chhmar during the civil war and knew the temple well. He was thus happy to be able to contribute to its restoration.

The stone conservator's work is mainly focused on the delicate repairs and conservation of the bas-relief stones (Fig. 10). As part of GHF's training programme eight local workers have been selected for formal training in stone conservation technology. The South Asia Conservation Restoration Agency (SACRA), a Khmer group that had been trained by the German Apsara Conservation Project (GACP), based in Angkor Wat, was contracted to undertake this training. Formal classroom training took place in Siem Reap as well as a series of site visits to study different conservation approaches. For most this was their first visit to Angkor. The practical experience was organized both in Angkor as well as on-site in Banteay Chhmar. The results have been extremely satisfactory. The team is working directly under the *chef de chantier*, and SACRA's chief conservator pays regular visits to the site to ensure quality and to help develop new approaches.

Fig. 11 Dismantling face tower 18N using a crane (Global Heritage Fund)

A unique feature of this training was that it was all conducted in the Khmer language. Friends of Khmer Culture Foundation funded this training programme.

A very specific task that had to be addressed was the structural repair of one of the priceless face towers that was threatening collapse. During the 2009 heavy monsoon, stones at the top of the tower shifted dramatically. To adequately support the tower temporarily would have been a complicated and expensive undertaking so the decision was to partially dismantle it before it fell. Using the crane the dangerous upper two-thirds of the tower were carefully removed after every stone was surveyed measured and drawn (Fig. 11). The stones are now being cleaned, repaired, and recorded using the local scanning device, and with the arrival of the project's new crane they will shortly be reassembled before finally being replaced stone-for-stone in their original position.

Virtual Completion of the Temple

A section of the bas-relief of the eight Avalokiteshvara was also used to demonstrate the precision of this system (compare Fig. 8). This exercise has led to the development of a new project proposal for the year 2012. Another significant sector of bas-relief, still extant, is located in the southwest sector, which is part of the West Enclosure Wall III. It consists of a very unusual and unique collection of eight Avalokiteshvara images,

sections of which were stolen. Of the eight, the first two images are extant, standing on either side of a doorway leading into the main complex. The next four were stolen in the 1990s, but two have been recovered and are now in the National Museum in Phnom Penh.[2] The other two are still at large. The two Avalokiteshvara images completing this mystery, still lie under a pile of fallen roof stones and some skilful investigations have proven them to be fairly intact. Following research by one of GHF's consultant scholars, photographic records have turned up early pictures dating from 1937, which give us a record of the originals, including those still at large—stolen—and those that are still buried. The virtual completion of the temple was also tested on a part of the temple's East Gopura III (Fig. 12a, b).

Local Community Involvement

The years of experience gained and observed in Angkor have provided the GHF Banteay Chhmar team with a great source of knowledge not only in conservation philosophy and technology but also in a site's management and protection. Sadly the knowledge and dedication of the local community is too often ignored. Fortunately, in Preah Khan, Angkor, we learned the value of the community and the importance of including them in the overall plan for the temple complex. We also learned from some of the early mistakes the administration fell into when deciding to remove the villagers to areas outside the designated monument zone. By doing this they lost their caretakers, their informers, but more importantly they lost the human scale and its association with the site. In Banteay Chhmar, although the local people are relatively new to the monument site and the seven or so settlements around the site have grown and shrunk over the decades of occupation, the local community has as a result of the project's existence become more interested and committed to the role it could play in the community. GHF employs about forty five people on the site; the cultural heritage guards have been increased from a mere five to over twenty-five. As a result local families hear and know of the enormous potential for improving their income and their standard of living. The Community Based Tourism (CBT) project initially supported by the French foundation *Agir Pour Le Cambodge* (APLC) was taken over by GHF as a community activity and CBT provides visitors with a variety of local experiences along with tours of the temple

[2] Editor's note: The digital procedure to virtually re-assemble structural or decorative parts of the temple, which had not only collapsed in situ but were also taken away from the site, is comparable to Gruen's contribution in this volume to bring together different broken museum artefacts from different parts of the world.

Fig. 12 (**a**, **b**) Real and virtual images of East Enclosue Wall III looking south from Central Gopura (Global Heritage Fund 2012)

complex and home stays for overnight accommodation.[3] The major threat to the site is tourism. At present there is very limited service and access to electricity, water, and food and accommodation. Without a controlled and carefully thought out development plan the site could be ruined. CBT has organized workshops with the help of USAID to explain proper tourism management, and the MCFA has held meetings to underline the importance of controlling development around the site and the reasons for the limitations set for construction in the various buffer zones. Recently the MCFA has sought GHF's support in the development of a master plan for the historic site and its environs and this working document will be discussed and developed with input from the community and with their full consent.

Banteay Chhmar is indeed a major challenge. Today it is still a sleepy village community surrounding a unique site that is awaiting nomination to UNESCO's World Heritage List. Soon the main highway from Siem Reap to the Thai border will have a feeder road to Banteay Chhmar making it easily accessible from both Angkor and Bangkok. In ten years' time no doubt the visitor numbers will have gone from less than a 1,500 per year to in excess of 20,000 visitors. For this to happen water and electricity will be essential commodities, along with a sympathetic and coordinated town plan to create the new unknown destination, much needed in Cambodia to alleviate the pressures on Angkor and its environment.

The Banteay Chhmar Conservation Training Project has recently undergone a midterm review followed by extensive discussions with the director general of the Department of Culture MCFA. The project's direction meets the goals that were originally set—some of which are to establish an appropriate conservation philosophy—to develop suitable conservation technology for repairing the face towers and the bas-reliefs, and to assist the MCFA in the presentation of the site as one of Cambodia's great architectural assets.

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[3] Editor's note: From this perspective community involvement can be understood as project support for guardianship or tourism. New approaches of a 'living heritage'-philosophy bring local stakeholders into the centre of decision-making processes regarding conservation work and site interpretation (compare the contributions by Warrack and Chermayeff in this volume). The installation of 'authentic home stays' at, and 'authentic guides' through, the archaeological temple site may however, from a critical perspective, reduce the local inhabitants to *tableaux vivants* (compare the analysis of colonial guidebooks in the contribution by Falser, and Weiler's analysis of picturesque photography in this volume). The analysis of the role of local stakeholders in their daily social practices on site and the understanding of their migration history are important topics in academic research (compare Luco and Guillou in this volume), but are extremely rare in applied restoration practices.

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Angkor: Preserving World Heritage and the Role of Interpretation

Jane Clark Chermayeff

Abstract This paper presents an innovative model for preservation that is changing the way visitors and local communities visit, view, and care for historic and natural sites. This new model, already in practice at sites in Angkor, Cambodia, is based on a comprehensive approach to interpretation as a fundamental component of preservation. Conservation can ensure that the physical memory of a site is preserved; a comprehensive approach to interpretation provides a framework for ensuring that the physical and living heritage is communicated and preserved in a sustainable and meaningful way. Such an approach extends the idea of interpretation beyond signage and exhibits to encompass—indeed to require—multidisciplinary scholarship, understanding tourist needs, and the engagement of stakeholders and target audiences. Incorporating examples from Phnom Bakheng and Preah Khan, the paper explores how an early focus on interpretation during conservation project planning—using this comprehensive approach—can produce sustainable benefits for the whole site, the local communities, and tourists. It further highlights the formation and role of the APSARA Authority's Interpretation Advisory Committee, an unprecedented mechanism for advancing interpretation in the preservation and management decision-making process within the Archaeological Park of Angkor.

Keywords Interpretation • Cultural heritage • Local community • Tourism • Angkor

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Introduction

In the historic preservation field we often talk about stones; that is, about structures and their environmental conditions. But when we think about the actual experience of a place, both in the present and over time, the stories behind the stones and the physical narratives that monuments convey are often as significant as the constructions themselves. This is especially true at the historic city of Angkor—a place composed, quite literally, of stories carved in sandstone.

International conservation efforts of the past decades have saved the physical fabric of Angkor and other world heritage sites across the globe. Often as a consequence, these sites have witnessed explosive growth in tourism. At Angkor, international visitor numbers surged from one million per year in 2004 to close to two million per year in 2008 (before the worldwide economic downturn). These visitors join the 40,000 local residents and the thousands of worshippers and other Khmer visitors to the site (APSARA 2003). These groups together represent a valuable resource for the conservation of Angkor, as they may provide much needed care and support. As more people visit and populate world heritage sites such as Angkor, interpretation and community participation are gaining importance within the international heritage preservation field. In order to foster sensitive and thoughtful stewardship, I and my colleagues from Jane Clark Chermayeff & Associates LLC have worked to strengthen interpretation in support of conservation efforts by enhancing visitor understanding of this vibrant cultural landscape.

The Power of the People: Conservation Through Interpretation

In shaping our approach to increased visitation and the need for managed tourism (Fig. 1), we relied on the power of people: that is, the power of scholars to shape site history, the power of tourists to alter or sustain the sites, the power of community collaboration to build and maintain sites, and the power of stakeholders, including conservators, to create an environment where sites and monuments are valued by all. This interpretation methodology resulted in what we call conservation through interpretation—an innovative model for preservation in Angkor that is applicable to other historic sites throughout the world.[1]

To put interpretation efforts in context, it is important first to understand the history of Angkor's management. The archaeological park of Angkor encompasses a constellation of temples and other sacred sites built by Khmer kings from the ninth

[1] Editor's note: This approach is mirrored in several other contributions in this volume: concerning tourist guidebooks in the archaeological park (Falser), conservators trying to incorporate values and ideas of the local religious community into their management plan (Warrack), the appreciation of the social practices of local communities in scientific research (Luco, Guillou), and the role of virtual models and descriptive panels for the interpretation of archaeological sites (Cunin).

Fig. 1 Crowds at the top of Phnom Bakheng (2010) (World Monuments Fund)

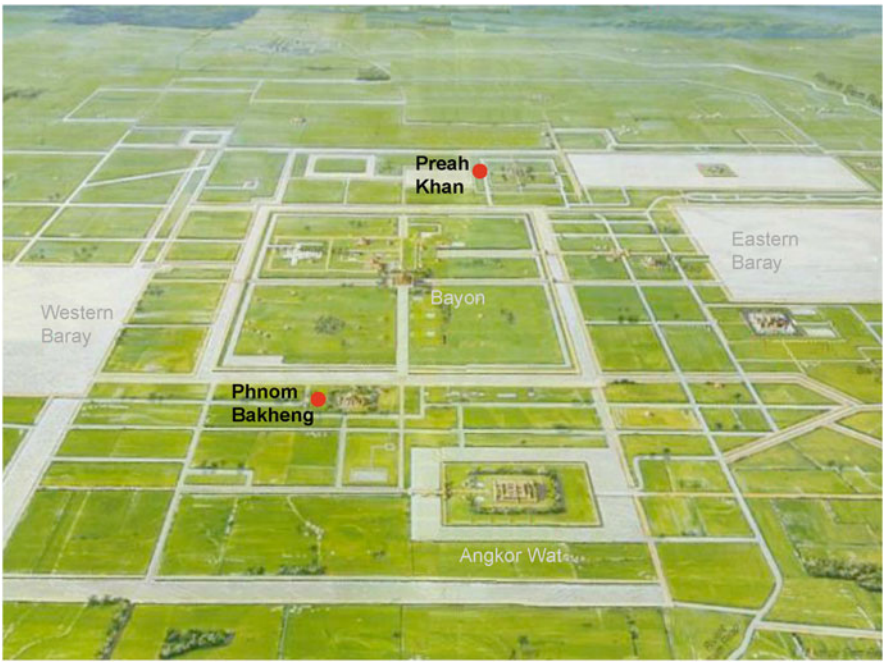

Fig. 2 Partial map of Angkor Park showing locations of Phnom Bakheng and Preah Khean (Google Images/JCC&A)

to the fourteenth centuries (Fig. 2). Angkor has always impressed its visitors (Thompson 2004)—from the Chinese diplomat Zhou Daguan, who arrived there in 1296 and chronicled Angkor's royal pageantry, to the French naturalist Henri Mouhot, whose travel journals, published posthumously in 1863, described monuments overgrown with trees and vines—a romantic vision that popularized

Angkor in the West. Mouhot described the main temple, Angkor Wat, as "grander than anything left to us by Greece or Rome" (Osborne 2000, 60). Under the French, who controlled Cambodia from the 1860s until the end of World War II, Angkor became the workshop of adventurers and archaeologists, as jungles were cleared and temples partially stabilized. Like the antiquities of Greece and Rome, many artefacts from Angkor's temples ended up in European museums.[2] Civil war halted conservation in the 1970s, and the four-year reign of the Khmer Rouge brutally suspended any chance for Cambodian scholarship or professional engagement with the site.

With relative peace restored, by the early 1990s the world had returned. In 1992, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) embarked on an ambitious plan to develop Angkor and safeguard its monuments. Working under UNESCO's auspices, international groups (from countries including Japan, India, France, Germany, and the United States) have adopted different approaches to site conservation at the hundreds of temples throughout the vast archaeological park, spread out over an area equal to the city centre of Paris. The focus of the extensive work carried out by conservation and archaeological teams had, naturally, been on the stone construction. These groups faced an urgent set of troubles—landmines, unchecked pillaging of artefacts, building collapse, and, more recently, unchecked tourism.

The original 'monument-centric' model of preservation at Angkor assumed that preserving the historic fabric of a site is the most urgent first step toward long-term preservation (Fig. 3). From this perspective, interpretation is often perceived as simply the packaging after the 'real work' of conservation is complete.[3] This attitude is demonstrated in the Angkor World Heritage Site founding document from 1993 entitled *Sauvegarde et développement d'Angkor*. Tim Winter, a senior research fellow with the University of Sydney's Centre for Cultural Research, and an expert on the political economies of heritage and tourism, analyzed the document. He found that of the fifty pages dedicated to "Future Challenges," forty four were concerned with monumental conservation concerns; two with archaeological concerns; two with regional development; and only one page with tourism development and national capacity building (Winter 2007). That attitude toward visitors is now changing.

In 1999 the International Council on Monuments and Sites (ICOMOS) published the *International Cultural Tourism Charter*, which states:

> Reasonable and well-managed access to cultural development and cultural heritage is both a human right and a privilege. It brings with it a duty of respect on the part of the visitor. Interpretation or presentation play an important role in making cultural heritage accessible to people. (Brooks 2008, 2)

[2] Compare the contribution by Baptiste in this volume.

[3] Compare the contribution by Falser in this volume.

Fig. 3 Early conservation methods at Angkor (World Heritage Fund)

ICOMOS is devoted to the concept of the 'Spirit of Place' as a sustaining factor in world heritage. In his paper entitled *Developing Guiding Principles and Policies for World Heritage and Sustainable Tourism—A Major UNESCO World Heritage Centre Initiative*, Graham Brooks, President of the ICOMOS International Cultural Tourism Committee, writes (compare Brooks 2010, 2011):

> While there is a significant material component to the *Spirit of Place*, one that is inherent in the physical remains of monuments, historic places and cultural landscapes, another, equally powerful component must be considered—the human transaction that goes to the very heart of finding, understanding, appreciating, enjoying and ultimately sustaining that *Spirit of Place*. (Brooks 2008, 1)

UNESCO's project *World Heritage and Sustainable Tourism* also addresses the importance of working with tourism to achieve desired conservation outcomes, and makes the case that the two are inextricably linked.

In December 2004 the World Monuments Fund (WMF) asked my firm, Jane Clark Chermayeff & Associates, to serve as site interpretation advisors along with a team of conservators and cultural landscape specialists to develop strategic plans for the monuments that the WMF was conserving with local architects and technicians. As consultants on numerous interpretive projects at heritage sites and museums worldwide, including the Torre de Belém in Portugal for the WMF and the Statue of Liberty for the U.S. Department of the Interior-National Park Service, we have come to understand how interpretation—telling the stories of the sites—can guide visitor flow and manage tourist traffic, while at the same time enhancing the visitor's experience and fostering a sense of site stewardship. We see interpretation

Fig. 4 Apsara dancers rehearsing at Preah Khan (Chermayeff)

as part of a continuous process—a tool in a comprehensive tool kit for managing change, including the physical and experiential damage due to overwhelming numbers of tourists. A well-planned program of interpretation ensures that visitors are not only informed and physically accommodated, but also engaged and invested in a site's care (compare Karp/Lavine 1991; Kirshenblatt-Gimblett 1998).

For our work at Angkor, we identified five significant tools for accessing a site's narrative power by collecting stories from as many sources as possible and bringing them to the forefront of site presentation. These tools and their outcomes are outlined in detail below (Fig. 4).

A Gathering of Scholars

When we arrived at Angkor six years ago, interpretation was found primarily in guided tours, guidebooks,[4] and scattered signs. There was no cohesion and little coordination of theme or flow. Our work began at Phnom Bakheng, the state temple built by King Yasovarman around 900 CE (Fig. 5) (Dumarçay 1934). One of the first of the key monuments to be built in what is now Angkor Park, it was the last to

[4] Compare the discussion of guide books about archaeological sites by Falser in this volume.

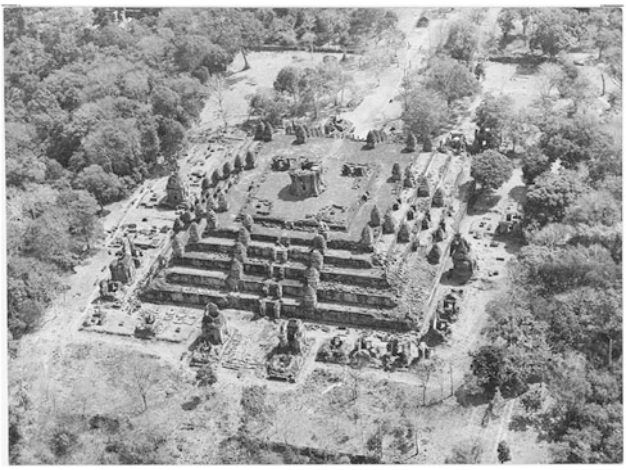

Fig. 5 Aerial view of Phnom Bakheng, 1963 (EFEO Paris)

benefit from international aid and has also become the first in which interpretive planning developed hand-in-hand with conservation (Chermayeff 2006, 2010; Ellis 2005/2006).

Phnom Bakheng had been declared 'the most threatened temple in Angkor' due to a brutal combination of heavy monsoon rains and unchecked tourist traffic at every sunset (Fig. 6). Each day at 4 p.m., 3,000 tourists arrive at the base of the Bakheng. Until recently, tour buses unloaded throngs of visitors who raced to the top to find the best spot to watch the sunset illuminate Angkor Wat. Few were aware that the narrow staircase they had just trampled was constructed over a thousand years ago for use only by high priests and the god king. For the visitors' purposes, it was a stairway to sunset stadium. Our interpretive challenge at Phnom Bakheng was fourfold: to engage a multidisciplinary team and local decision makers; to support site conservation; to reconsider hazardous visitor flow; and to reveal the stories of the place. To accomplish this, we recognized the need to bring the site's imposing narrative to the fore. Our initial research showed that the conservators caring for the monument and the primary scholars studying Phnom Bakheng were not communicating with each other. In December 2005 we convened the Scholars Workshop on Phnom Bakheng. The two-day workshop brought together a wealth of local and international expertise, which provided the critical foundation for the site master plan for both interpretation and management at the site.

Among the workshop presenters was Chau-Sun Kérya, the tourism expert at APSARA, the local Cambodian authority responsible for developing Siem Reap and Angkor. Kérya stressed that crowd-management problems at Phnom Bakheng stem not only from numbers, but also mainly from hourly distribution. Indeed, all guides, whether people or books, direct visitors to Phnom Bakheng only during

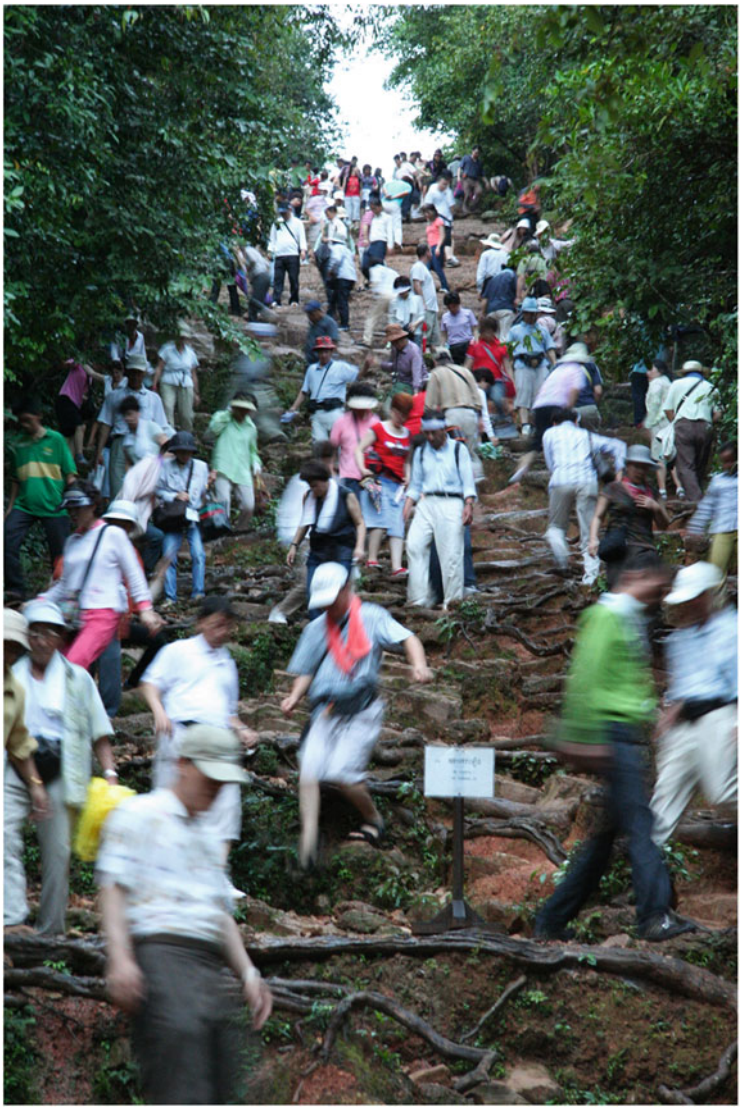

Fig. 6 Tourists on the eastern staircase of the Phnom Bakheng (Tim Winter 2005)

sunset. The effect was catastrophic. Working together with our site management colleagues, we took the findings from our in-depth research and proposed an alternate tour route—the Panoramic Trail at Phnom Bakheng. As a result, the hectic eastern staircase is now closed. This new trail invites tourists to circumnavigate the

Fig. 7 Panoramic Trail proposed signage for the Phnom Bakheng (Source: JCC&A (2006)).

entirety of Bakheng Mountain.[5] Following the interpretive themes outlined in the Comprehensive Management Plan for Phnom Bakheng, wayside signage will identify rice field landscapes and the tenth-century city plan. From the height of Phnom Bakheng, the visitor can understand the geographical as well as man-made elements, and comprehend the founding logic of Angkor's impressive civilization and astounding network of waterways. Installed close to the terraced forms of the temple, *Conservation in Action* panels now help explain the work in progress to stabilize the structures. When complete, visitors will leave with a geographic and cultural understanding of the temple in its context and relationship to the surrounding Angkor Park (Fig. 7).

Meetings with the Community

Angkor has layers of communal memory—tales, legends, and place names. Within the park are 213 villages, some of them comprising thousands of inhabitants. As major projects develop at Angkor, these residents have had little say in decision making, and their knowledge and interests have rarely been considered in the management of the park's resources. Through our research, we not only met with archaeologists, historians, and conservators, but also horticulturalists, hydrologists, community chieftains, monks, shopkeepers, and schoolteachers. These contacts,

[5] Editor's note: The elaboration of panoramic parcours stands, however, in a certain tradition of prescribed picturesque parcours in the way they were conceived in colonial guidebooks until today (compare the contribution by Falser in this volume). Visitors guiding (audio) systems are certainly valid answers to divert destructive mass tourism. The question of how the quantity of tourists might be reduced overall is, however, a political decision to be made by the ruling Cambodian authorities. The necessary, post-inscription monitoring of UNESCO World Heritage sites such as Angkor is, unfortunately, rarely executed.

Fig. 8 Meeting of Phnom Bakheng Community and religious representatives (2005) (Jill Gilmartin)

in turn, represented a range of interests, beliefs, and even ethnicities. As the anthropologist Fabienne Luco noted:

> Trying to define a homogenous local community with specific links to Phnom Bakheng is rather difficult, depending on whether the classification is geographic, social, or economic. Several villages of rice farmers are scattered in geographic proximity to Phnom Bakheng. Socially, we could define two local communities: the people of Tropeang Seh and the people of Kok Chan, who define themselves as distinct social units sharing a common history, ancestors, and veneration of the same *Neak Ta* (land spirits). (Luco 2006, 124)

Other villages in Angkor have economic links, such as local sales of handicrafts at the entrance to Phnom Bakheng. Additional fieldwork is required to better understand the interactions among the local communities within the specific location (Fig. 8). In response to this diversity, we worked closely with our APSARA partners and local religious leaders to convene a series of community meetings during which we listened to conversations about the nature of this place and how it should be presented to the floods of international visitors arriving daily.

The local residents' responses reminded our team that history is a continuum and also showed us that the communities living within the park could be engaged in supporting conservation efforts.[6] Below are some of their responses:

- Angkor is more than a monument. It is an important agricultural community, a vast cultivated plain, a living community surrounded by forest.
- Certain temples, including Phnom Bakheng and Preah Khan, are still used for ritual practices, and two local festivals are held annually at Phnom Bakheng.
- Visitors should slow down so they can understand that these places are designed as sacred spaces. The structures themselves have meaning. Visitors might then recognize that our lifestyle today within Angkor Park is a continuation of what they see depicted in the reliefs, and that we are proud of the glorious Khmer Empire and all its power.
- We wish to have control of the forest and its products, such as resin, firewood, and medicinal plants, as we have had for generations (APSARA presently forbids local harvesting).

[6] Compare the contributions by Warrack and Luco in this volume.

A key realization that emerged from the meetings was the understanding that today the conservation and upkeep of monuments and historic structures rely on maintaining their value as tourist assets. With tourism as a given, how do we as planners in the twenty-first century prepare to balance the conflicting values of visitor expectations with the physical and technical transformations of the local populations living within or near these sites? How do we formulate an economically viable planning apparatus that considers the conflict between outsiders' expectations and insiders' reality?

Providing Space for the Present

From Phnom Bakheng, the WMF asked us to work on interpretation for Preah Khan, the 138-acre complex, which is about one third the size of Central Park in New York City. Preah Khan, or the place of the 'Sacred Sword,' was built in the twelfth century by King Jayavarman VII and functioned as a walled city with thousands of inhabitants working to support the Buddhist temple. In the conservation world, Preah Khan is officially preserved as a partial ruin. This is a fairly romantic description, and one that captures the imaginations of thousands of tourists. In reality, however, Preah Khan is an active place as many of the villagers of the closest community, Liang Dai, continue to work and worship here. The WMF asked us to redevelop and redesign the existing, dilapidated visitor centre (Fig. 9). Again, we took a comprehensive approach to interpretation by working with our Cambodian partners beginning in February 2009.

The gallery and visitor centres were designed and developed with tremendous input from the community through meetings and in-person interviews with local villagers, religious and governmental leaders, and WMF staff, both American and Khmer. The architecture of the centre reflects local design: plant leaves from the local Kulen Hills serve as roofing material, louvered walls provide ventilation (since there is no electricity), and stilts prevent damage from flooding and termites (Fig. 10). The original design team included two architects, Hem Sinath and Sam Kimheng, who were trained at the Royal University of Fine Arts and hired by the WMF, as well as architect Ivan Tizianel. The members of the construction crew were all from the local precinct.

Our intention with site interpretation was to explore the site as a whole and over time. Therefore, interpretive panels inside the Preah Khan Visitor Centre tell the complete conservation story and explain the process and importance of work sponsored by the WMF. The first curated exhibition consisted of photographic portraits of residents from the Liang Dai village by Mak Remissa (Fig. 11), a renowned Cambodian photographer for Associated Press (AP) whom the WMF commissioned to chronicle the daily lives of residents in Angkor. This exhibit emphasizes and reflects the values and cultural identity of the community—in broad terms—represented by the visitor centre, the first example of its kind at

Fig. 9 Preah Khan Visitor Center exterior (2009) (JCC&A)

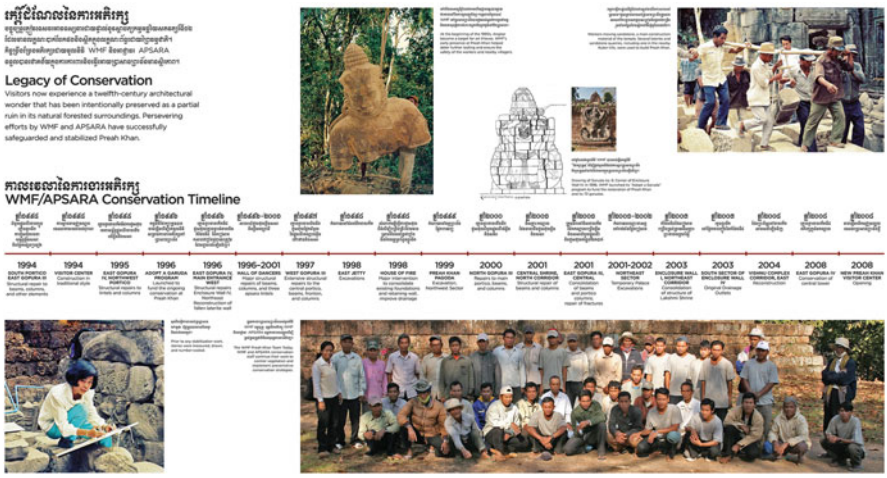

Fig. 10 Preah Khan Visitor Center interpretive panel (2009) (JCC&A)

Angkor. Indeed, its function and inclusion of community input are a rarity anywhere. The interpretive themes that inspired the visitor centre are outlined in the sidebar (Fig. 12).

The visitor centre exhibit, while small in size, also reflects local history, lore, and contemporary uses while acknowledging Preah Khan's history as a place of learning and healing. The community was very intent on including the forest in

Fig. 11 Liang Dai village (2009) (Mak Remissa 2009)

Fig. 12 Sidebar at the Preah Khan Visitor Center 2009 (JCC&A)

Preah Khan Interpretive Themes

Core Theme:
Preah Khan is a sacred site—built by Jayavarman VII—in a striking natural setting supported through the centuries by a dedicated multitude living in and around its walls.

Main Themes:
The city of Preah Khan thrived in the 12th century during the time of the power and the glory of Jayavarman VII.
- Building and construction during the time of the great master builder at Angkor
- Buddhism and the god king
- The city and the people of Preah Khan
- Ceremonial and ritual life
- The role of water

The art and architecture of the Preah Khan temple complex tell its stories.
- Importance of the stele
- From Buddhism to Hinduism
- How to understand a Khmer temple (Gopura gateway, East entrance, bas reliefs, enclosures, center sanctuary, etc.)
- Preah Khan's iconographic elements (garuda, naga, Two storey pavilion, apsara dancers, south gate giant, etc.)
- Legend of the sacred sword
- The "Bayon style"
- Constructions and additions over time
- The decline of Angkor and Preah Khan

Overrun by the jungle at the end of the Khmer Rouge period, Preah Khan is preserved by the efforts of the WMF.
- WMF's partial ruin methodology
- WMF and Khmer staff training
- The dharmasala before and after
- The French conservation at Preah Khan
- Conservation d'Angkor, vandalism, and looting
- APSARA and the future of Preah Khan

Today Preah Khan is a living site.
- Neighboring communities in the park
- Place of medicinal healing
- Diverse flora and fauna
- The trees and stones coexist
- Religious ceremonies at the site (neak ta, Two storey pavilion)
- The living arts (dance, music, crafts)
- Ongoing scholarship and research

the interpretation of the place. Young parents, who as children would hoard *chun lou* berries and other edible plants to survive in the forests around Preah Khan during the Khmer Rouge period, talked about their desire for a place to tell their stories to their children. Because of these discussions, the site will soon feature a medicinal garden—an idea wholly initiated by the local communities, but one that will surely engage visitors in the site's living heritage. Inside the visitor centre, a community gallery also includes an area for demonstrations and performances by local craftspeople and musicians.

Developing Local Expertise

At the request of APSARA, we organized the formation of its first-ever high-level working committee on interpretation, and participated in the inaugural meeting of the Interpretation Advisory Committee (IAC) in June 2006. The IAC brought together an unprecedented group of department heads, staff, and advisors to develop models for an integrated approach to interpretation, conservation, and visitation at Angkor. Central to the IAC is a belief that public understanding of the multifaceted significance of Angkor is critical for the long-term preservation of Angkor Park and its temples. This IAC forum ensures inclusive and representative involvement in important decision making about the visitor experience, as well as long-term site management. The IAC promises to help planners look beyond the needs of conservation to include the needs of visitors and communities.

Since APSARA recruited the best and the brightest from throughout the country to work in entry-level positions, we planned a special working session with the junior staff at APSARA. Capacity building within this young and talented group was essential to their future success in managing the Preah Khan Visitor Centre and the visitor experience at the site. In an effort to provide presentation opportunities for local basket makers, the junior staff organized the acquisition, labelling, and display of baskets designed for fishing, trapping, and storage in the visitor centre.

Technology Supports Interpretation, Conservation, and Visitor Management

Technology is an important tool for interpretation that can also help support conservation issues. For example, a virtual 3D rendering can provide a fully restored and finely detailed scale model of the site in all its intricate glory (Fig. 13).[7]

[7] Editor's note: Here it is necessary to consider the use and abuse of virtual models. The contribution by Cunin in this volume argues that the picture-perfect renderings of a reimagined ancient glory of temple sites should be quite abstract in order to avoid essentializing and stereotyping effects (compare also Gruen). Renderings can be useful to document restoration efforts (compare Toubekis/Jansen, Sanday); at the other end of this spectrum are renderings of idealized temple decorations (compare Nguonphan).

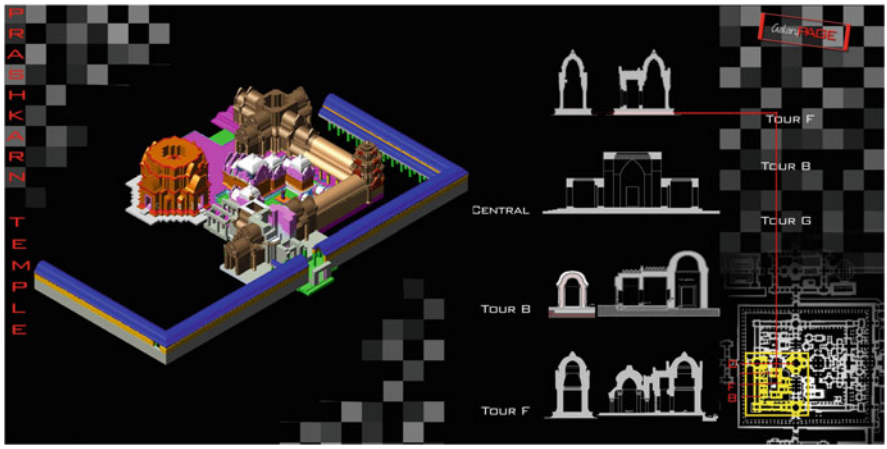

Fig. 13 3D model of Preah Khan (2009) (University of Heidelberg Institute of Scientific Computing & Royal University of Fine Arts, Phnom Penh (2009))

During an IAC meeting, Michael Winckler from Heidelberg University's Institute of Scientific Computing and the Royal University of Fine Arts (RUFA) team presented the vision for the 1:120 scale model of the labyrinthine temple to the partners, including His Excellency Ros Borath, APSARA's Deputy Director General and the head of its Department of Monuments and Archaeology. Ros Borath illustrated the power of this kind of interpretive tool. He bent down as if to peer though the miniature doorways and exclaimed "This will help (people) see the spaces within the space." Replicating the physical grandeur of Preah Khan, a temple within a temple, as well as a temple within a city, to this degree of detail would be nearly impossible otherwise.

Presently, JCC&A is working with Antenna Audio/Discovery, in partnership with APSARA, to implement a world-class visitor management system for Angkor to support conservation efforts. The Group Tour™ System is an innovative audio system developed to allow Angkor's tour guides to communicate with their parties via radio transmission. This is not a traditional audio tour with prerecorded content. It is an enhancement of existing group tour protocols. Rather than shouting to be heard over the din of other groups and other languages, tour guides speak into a microphone, and their voices are heard in the visitors' headphones. Wide distribution and use of this technology affords an opportunity to enhance the visitor experience of Angkor Park by quieting the noise impact of large international tour groups. Technology at heritage sites must not be designed to distract from the authentic, but rather to provide auxiliary learning materials and, where necessary, the opportunity for unobtrusive, positive visitor management.

Conclusion

At some point the European and American conservation teams will have to leave Angkor and our Khmer colleagues will assume the management of the site. When we first arrived in 2004, the decision makers were the architects and stone conservationists. The situation has changed since then, and interpretation is now integrated into the management of the site. As interpretive planners, we can assess and communicate what the surrounding community wants and requires from the site and its capacity to invest time, care, and resources. We can work with the local Khmer to develop the public presentation of the site. We can address the needs of tourists and work to change attitudes and understanding.

More fundamentally, engaging local stakeholders through the interpretive planning process provides both a way for important stories to emerge alongside technical expertise and a way for the storytellers to see themselves as essential to site presentation. Without direct communication, local groups may feel marginalized in the process of planned development and, therefore, less likely to comply with heritage imperatives. By integrating interpretation into plans for Phnom Bakheng and Preah Khan, we have promoted an innovative approach to conservation—one that may serve as a prototype that can be adapted and improved upon throughout Angkor and beyond.

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Developing Conservation Approaches to Living Heritage at Angkor: The Conservation of the Statue of Ta Reach

Simon Warrack

Abstract Changes in religion and politics tend to have an impact on heritage that is usually clear and easily identifiable. Changes in perception and conservation approaches can be less easy to identify but can have as great an impact. This article explores the change in approach to conservation through the history of the temple of Angkor Wat and how this and other sites have always been strongly influenced by the political and religious climate of the time. The specific example of the conservation of an important statue in the western gate of the third enclosure of the temple carried out in 2003, provides a concrete example of how the archaeological/scientific approach to conservation can develop into a more integrated and holistic approach that is compatible with both the requirements of the local community as well as the heritage community.

Keywords Conservation • Cultural heritage • Living heritage • Archaeology • Angkor Wat

Introduction

Understanding and conserving the testimony of change in a living site is as complex as it is important, and a site with the dimensions, complexity, and importance of Angkor requires even greater sensitivity and attention to a broad spectrum of issues. Opinions as to how and what should be conserved have changed with time all over the world and this is no less true at Angkor where the autochthonic perception and conservation of what we now call heritage developed with the changes in politics and religion. The management of the sites by the Hindu kings, the Mahayana Buddhist kings, and the Theravada Buddhist religious community was, with the

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Fig. 1 A detail of the gallery relief at Angkor Wat depicting the Battle of Kurukshetra from the Mahabharata (Jaroslav Poncar)

implementation of the French Protectorate, abruptly replaced by the archaeological approach that was characteristic of the age in Europe. This had consequences that are still influencing the way that conservators approach the restoration of the temples today. As conservation approaches have developed across the world they have also changed in Angkor and an understanding of how these approaches have developed over time helps us to understand how conservation is approached today.

Historic Context: The Role of Royal Patronage

The temple of Angkor Wat was commissioned in the early twelfth century by King Suryavarman II who, like his predecessors, was Hindu. He dedicated the temple to Vishnu and decorated the galleries with scenes from Hindu epics. These scenes were chosen not merely to demonstrate the piety of the king but also to reinforce his initially tenuous claim to the throne, which he came to as the usurper of his cousin who was probably the rightful heir; thus the choice of the scene in the first gallery which depicts the battle of Kurukshetra between the sibling clans the Pandavas and the Kauravas, is almost certainly no coincidence (Fig. 1). Since King Suryavarman II would have been keen to draw parallels between his own life story and that of the cousins who fought in the battle, it is likely that this battle was chosen to demonstrate that his claim to the throne was justified by divine scripts. Moreover, in order to affirm that a golden age would ensue in the wake of his divinely ordered victory,

Fig. 2 (**a**) An example of the destruction of Buddha images that occurred during the reign of Jayavarman VIII; a Buddha at Neak Pean Temple that has been re-carved in the form of a Shiva Linga (**b**) A *lokesvara* at Neak Pean that was disfigured during the Hindu iconoclastic period (Warrack)

he would also have been keen to underline that following the famous battle peace and prosperity reigned (see for the bas reliefs of Angkor Wat Poncar (2006)).

The temple was built as a representation of the heavenly paradise over which the god king presided in his terrestrial manifestation. In the same way that the European kings took full advantage of the concept of divine right, so too did the Khmer kings find this concept equally convenient in establishing their authority. Angkor Wat acquired a central place in Khmer life and culture, and as the centuries went by later kings also adapted and embellished it in order to bask in the reflected glory of this extraordinary achievement. Though other kings would build great temples, it was Angkor that remained at the heart of the Khmer character and psyche.

Under Jayavarman VII the state religion changed to Mahayana Buddhism and a huge temple building programme was initiated, during which many of the better-known temples were built, including the Bayon. His approach was one of tolerance to other religions and there was no lack of respect for Hinduism or for the temples built by his predecessors. The same could not be said for Jayavarman VIII who was a fervent and radical Hindu and who launched a programme of iconoclasm, which has left its mark on most of the Buddhist temples built by Jayavarman VII. Sitting Buddhas were re-carved to take the form of Shiva Lingas and images of Buddhas and ascetics (*Rshs*) were systematically chipped away (Fig. 2a, b).

After Jayavarman VIII the kings returned to Buddhism, but as the years went by the civilisation began to slip into decline; in 1432 the city of Angkor Thom was sacked by the Siamese and the kings moved away only to return in the sixteenth century with King Ang Chan and King Satha both of whom launched major restoration programmes. It was in this period that they finished the northeast corner of the galleries following the preparatory designs that had been left on the walls by the artists of their ancestor Suryavarman II. This is interesting because even

though the king was now Buddhist he recommended that his restorers finish the plans for the Hindu epic scenes rather than make new designs that would glorify himself and his reign, stating in an inscription that this was in respect for the achievements of his ancestors. In this way he hoped to bask in the reflected glory of those who had first built the extraordinary temple and to reestablish his royal power. However, it is also recognition of the value of the creations of the past, which sheds light on his perception of heritage. Although this is far from a modern heritage conservation approach it does demonstrate that there was a partial awareness that the testimony of the beauty and culture of the past should be conserved.

It is also extremely likely that big statues were brought in from other temples that were ruined by that time, and the statue of Ta Reach in the western gate of the third enclosure and also the giant standing Buddha in the cruciform gallery are almost certainly examples of this campaign of restoration and embellishment. These interventions are recorded in various inscriptions, in particular one in the central sanctuary, which recounts that:

> When His Majesty the great devotee rose to the throne as protector of the royal line, he sought to elevate the religion of the Buddha in truth by restoring the great temple of Brah Bisnolok (Angkor Wat); stone by stone, he restored its summit with its nine pronged spires, embellishing and covering it in gold.

Another inscription describes the restoration process in which Mahakalyanavatti Crisujata, the mother of King Satha, proudly tells how she:

> [. . .] was struck by the work of my royal child who, filled with devotion, has restored the Brah Bisnolok of the Ancient Cambodia in its true ancient form. My heart takes part in this work and overflows with joy. So I have decided to give up my marvellous locks of hair and to celebrate the *muddhabhisek* in the sanctuary of the Brah Bisnolok. I will burn my hair and with the *kmuk* [ashes] so obtained I will fix the statues of the Buddha in this gallery of the Bakan. (Levitz 1970, 104; Warrack, trans.)

When the religion changed from Mahayana Buddhism to Theravada Buddhism in the later part of the post-Angkorian era, the major restoration programmes declined. Instead, pilgrims brought donations in the form of incense, silver, and also statues of the Buddha, which began to fill the sanctuaries, corridors, and above all the cruciform gallery. In fact, this gallery is still known as the 1,000 Buddha gallery to local communities. Pilgrims also brought in gold leaf and silk robes, which they used to decorate the images, a tradition which also continues to this day. This was the situation met by the French archaeologists and architects when they took control in the nineteenth century.

Foreign Interventions and Changes in Approach

In 1858 the French explorer and naturalist Henri Mouhot led an expedition to Siam supported by the Royal Geographical Society and the Zoological Society of London, and in 1860 he reached Angkor. Although he is often credited with

'discovering' it, European adventurers and missionaries,[1] Japanese traders, and Chinese diplomats had actually visited Angkor throughout the post-Angkorian period, and Mouhot himself mentions the journals of Father Charles Émile Bouillevaux (Bouillevaux 1858), a French missionary based in Battambang, who visited the site five years earlier. In spite of the British funding of his expedition it was eventually the French who chose to expand their sphere of influence into what they came to call *Indochine* and to establish the French Protectorate in 1863. However, it was certainly Mouhot who popularized Angkor in the West through his journal *Travels in Siam*, *Cambodia and Laos* (Mouhot 1989) in which he gave a rather romantic description of the lost ruins in the jungle ascribing, as was the fashion of the time, the origins of civilisation to the Middle East and Europe; an approach that, to a greater or lesser extent, tended to affect approaches to Cambodian culture over the following centuries.

The extraordinary research and restoration work that was then carried out by French scholars, in particular those from the *École française d'Extrême-Orient* (EFEO) provided Europe with unprecedented documentation of a civilisation and culture that had been shrouded in mystery since early explorers' reports. Their approach, which was essentially based on the restoration of structures through anastylosis, along with their efforts to present the temples in what was considered to be their most authentic aspect, was in line with the European conservation philosophy of the time.

This was the age in which many of the churches in Rome were stripped of their Baroque ornamentations to reveal their early Christian origins and others were completely demolished in order to uncover the ancient structures beneath (Jokilehto 1999). In France and England cathedrals were likewise, restored in Gothic style, so it should come as no great surprise that the colonial authorities at Angkor and other sites adopted a similar approach to restoration and in taking over management from the religious community, carried out a series of interventions that removed what were considered to be relatively unimportant late additions. The south door in the central sanctuary of Angkor Wat, which had been closed when the temple was converted to Mahayana Buddhism, was opened up in order to explore the central sanctuary for archaeological reasons.[2] In doing so they destroyed the standing Buddha that had been installed there in the sixteenth century. Moreover, the majority of the statues that were now perceived as cluttering up the cruciform gallery were transferred to the depot of the *Conservation d'Angkor*, regardless of the fact that these were still venerated by the monks and by visiting pilgrims who were no doubt still bringing in donations.

[1] The Portuguese trader Diogo do Couto visited Angkor in 1583 (and stayed for ten years); in 1583, Lopo Cardoso and Joao Madeira visited; in 1584 Sylvestre d'Azevedo passed through; and in 1585 the two missionaries Frs Dorta and Caldiera also recorded a visit. The Portuguese monk Antonio da Magdalena also wrote of a visit to Angkor in 1586.

[2] Compare the contribution by Falser in this volume, and the case-studies by Sengupta and Pichard about the manipulation of heritage sites during colonial and dictatorial rule.

In other sites the same approach was adopted and the gigantic sitting Buddha that had been constructed over the central tower at Phnom Bakheng was dismantled and its stones thrown into the forest. The reclining Buddha at the Baphoun was, in all likelihood, destined for a similar fate until methodological approaches changed in the late twentieth century. Little regard was given to the fact that these temples, or at any rate the major temples, were actually being used by the local religious community. By breaking the link with the monks who were living in the sites and managing them, the final link with the Khmer builders of the temples was severed and, for the first time, they became archaeological sites rather than temples. Of course, the communities were still allowed to use them to a certain extent, but the management of the sanctuaries became the management of heritage and the colonial heritage authorities made the decisions (Baillie 2007; Miura 2005). The architects saved an enormous amount for posterity and brought to light an extraordinary quantity of information that had not been studied before and may have been lost had the work not been done at the time, but there was little consideration for the living aspect of the site.

The conflict that tore the country apart in the 1970s and 1980s effectively froze all conservation activity; however, it is interesting to note that Angkor remained at the heart of the Khmer psyche even during the Khmer Rouge period,[3] and that they kept the image of the temple on their flag and used the temple of Angkor Wat itself as a centre for their more important regional cadres.

Conservation work only resumed in the late 1980s by which time attitudes had changed again, and the conservation projects were modified as a consequence. This change in approach was reflected in the setting up of the International Coordinating Committee under the auspices of UNESCO, which was formed to manage and coordinate the huge influx of assistance and expertise that descended on Angkor following its inscription to the World Heritage List in 1992 and the United Nations Transitional Authority in Cambodia (UNTAC) monitored elections in May 1993.

Recent Developments in Approaches: From Archaeological to Living Heritage Conservation

The approach to conservation changed quite radically, tending to be less interpretative, particularly following the publication of the Nara Declaration (1994)[4] when a clearer definition of the concept of authenticity was made. This new approach was given added impetus by the inscription of the site to the World Heritage List. Conservation of sites as ruins and a greater respect for the environment became

[3] Compare the contributions of Luco and Guillou in this volume.

[4] The need for this meeting, and subsequent charters, grew in part from the fact that it had become clear that there were differences in approach between Asia and Europe regarding what should be conserved (Nara 1994).

defining principles in the new projects that were proposed and approved for implementation by the *International Co-Ordination Committee for the Safeguarding and Development of the Historic Site of Angkor* (ICC), and there was a gradual development of awareness of the need for community involvement and respect for living religious heritage that had been absent in the earlier years of the twentieth century. Furthermore, inscription to the World Heritage List defined protective buffer zones, which have protected the archaeological site from the huge rise in tourism that would otherwise certainly have had a much heavier impact on the authenticity and sacred nature of site.[5]

There are now a large number of international teams working on the sites in the Angkor World Heritage Site, and at Angkor Wat alone there are at least four different projects dealing with a variety of conservation issues. The GACP[6] is mainly concerned with the conservation of the carved reliefs at Angkor Wat and it was due to this attention to the specific issues of stone conservation that the staff of the APSARA National Authority contacted me in 1998 (while I was the chief stone conservator for the project) regarding problems that they had noted in the state of preservation of the great statue standing in the southern arm of the West Gate to Angkor Wat. They had observed, during routine monitoring, that there was severe cracking at the shoulder of this important piece. I confirmed that the cracking was indeed serious and was putting the statue and the visitors at risk. This set into motion a process that was to lead eventually to a conservation proposal submitted for approval in 2000 and a broad based multidisciplinary conservation programme that was implemented in 2003. The success of this conservation operation is a clear indicator of the value of a multidisciplinary and holistic approach to conservation issues, which is not only a far cry from the early twentieth-century interventions, but is also, perhaps, a step away from the purely scientific approach which has characterized recent operations.

A Holistic Approach: The Conservation of Ta Reach

The statue, which is often mistaken for Vishnu, is 3.5 m tall, has eight arms and is the object of veneration for hosts of Cambodian pilgrims from local villages, distant provinces, and even from the diaspora. It is the central figure in the extremely important animist cult of Neak Ta, which permeates many levels of Cambodian society and exists in harmony with the Buddhist faith.

Neak Ta is an ancient form of animism that places a strong emphasis on reverence for ancestors, and for the spirits of the earth and all natural things. The

[5] Tourism has risen from around 30,000 per annum in 1994 to more than 2,000,000 per annum in 2010.

[6] German APSARA Conservation Project directed by Prof. Dr. Hans Leisen from the University of Applied Sciences, Cologne and funded by the Foreign Office of the Federal Republic of Germany.

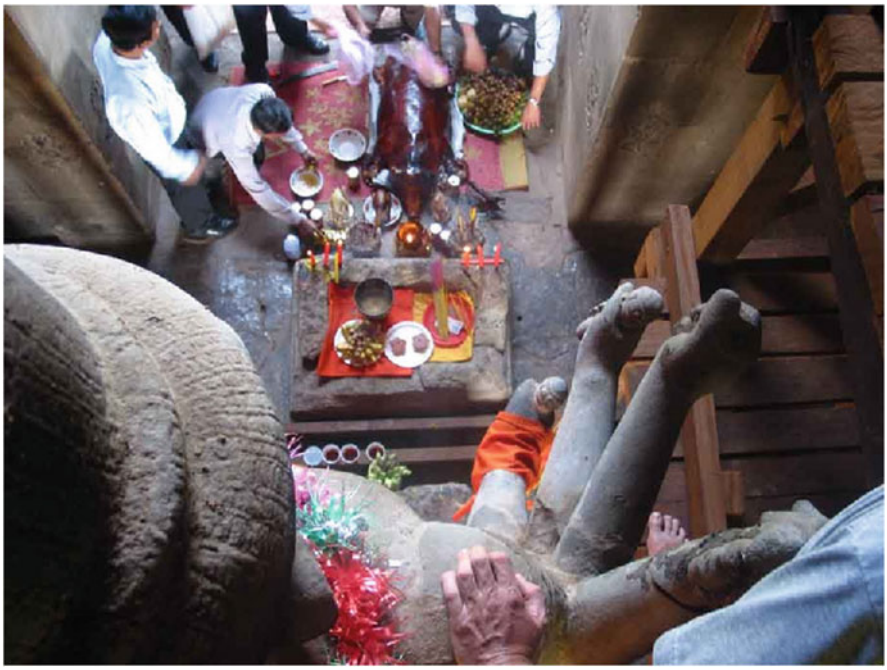

Fig. 3 A donation being made to the statue known as Ta Reach showing how the scaffolding design permitted the ceremonies to continue during the conservation intervention (Simon Warrack)

king of these spirits is embodied by the statue of Ta Reach and such is the importance of this King of the Spirits that one member of the community acts as a medium giving the believers the opportunity to communicate with him. Cambodians from every level of society, from rich businessmen to young village brides, will come to pray in front of the statue on special occasions and will always leave donations that vary from a few hundred Riels,[7] to whole roast pigs, boiled chickens, rice wine, and fruit (Fig. 3). Ta Reach is considered to be the strongest of the spirits and is capable of bringing good fortune in love, family life, and especially in business.[8]

'Conservation practices need to take account of an object's dynamic physical environment' (Clavir 1994). This means that an assessment of the object's

[7] One US dollar is equivalent to approximately 4,000 Cambodian Riels (2013).

[8] Editor's note: The role of Neak Ta is discussed from two other perspectives in this volume. Luco discusses the presence of the holy spirits in relation to supposedly 'dead archaeological ruins' and Guillou explores their role in the post-traumatic society of Cambodia after the Khmer Rouge genocide. How colonial and other authoritarian regimes try to overwrite living religious usage patterns in supposedly pure archaeological sites is discussed by Sengupta for colonial India, by Falser for Angkor during French colonial times, and by Pichard for British colonial Burma.

significance in social and spiritual terms as well as its condition is an essential prerequisite to any conservation operation (Eastop 2003).

The tendency for foreign, and most often European, heritage professionals to intervene without consultation in the heritage of another culture is now increasingly seen as inappropriate and part of the practice of a previous age and approach. In light of this it was extremely important, given the social and religious significance of this statue, that great attention be paid to the sensibilities of the local community—this was made a priority. Moreover, the information that can be gleaned from those who have grown up in and around the temples and who, correctly, see themselves as the custodians of the spiritual heritage that was created by their ancestors, should be given the same importance as the scientific data provided by conservation technicians when planning a conservation operation. As a result, meetings were held in the villages near the temple, in particular in the community of Trapeang Seh, with the leader of the spiritual community, known as Achar. These were informal and friendly affairs held in the home, with translators when necessary. They were asked about the significance and role of the statue in their community and how they felt about an eventual conservation operation. There was discussion about the appropriateness of materials, of types of intervention, and of the times of the intervention, so that—should it be approved—the intervention would take place at a time when there would be as little interruption as possible to the festivals and ceremonies that are carried out throughout the year.

The main issues concerned the head, which was a cement cast of the original and had been removed about a decade previously for security reasons following a failed theft. After complex research through documentary and photographic archives, it was discovered that the original head had been located in the Royal Palace in Phnom Penh and had then been transferred to the National Museum next door.

The other issue concerned three of the eight arms that were missing and had been restored with poorly executed cement copies in the 1980s. The Achars was very excited to hear that the original head had been found and asked if it would be possible to return it to its original position. He also felt strongly that the cement arms were unsatisfactory and should be replaced with new arms carved from local stone, which, according to Neak Ta beliefs, was the home of the spirits of the earth like the rest of the statue. The statue has been lacquered and this ancient coating was detaching in places; thus, the conservators proposed that, given the importance of using local natural materials, it might be possible to consolidate this ancient lacquer using the same materials from the local resin tree *Rhus Melanorrea*. This proposal was met with enthusiasm from the Achar since this material too would satisfy the local spirits and, in particular, would please Ta Reach. It was agreed that the conservation programme would take place in between two important festivals and, significantly, a scaffolding design was prepared that would leave the front of the statue open to the public to allow veneration to continue during the conservation operations. Finally, an explanation board was prepared in English, French, and Khmer that informed the visitors of the nature of the conservation operation and the opening and closing dates.

The Achars then invited the conservators to attend an important ceremony that was taking place the following day, an invitation that was gladly accepted. This

Fig. 4 A woman from the community communicating with the spirit of Ta Reach through the entranced medium (Simon Warrack)

ceremony involved the medium, who is not the Achar himself, but is another essential figure in the Neak Ta faith. He becomes possessed by the spirit of Ta Reach, the King of the Spirits, and then acts as a medium between the spirit and the local community (Fig. 4).

A woman was nominated to whisper the latest important information and news in his ear so that he could then react. During the ceremony attended by the conservators, the woman informed the medium that there was a proposal to remove his cement arms and head, at which point he became very disturbed and began to cry. She quickly reassured him that this operation was going to be followed by the return of his head and the addition of new arms that would be made from stone from the local hills. He rose to his feet, smiling, and began to dance, stretching, and exercising his new stronger arms.

The process of getting permission to return the head had initially proved a lengthy and complex one since the body was under the administration of the APSARA National Authority and the head was now in the National Museum, which is managed by the Ministry of Culture and Fine Arts. Such was the importance of this statue and, in particular, such was the importance of this statue to the local community, that these bureaucratic difficulties were eventually resolved. However, it should be noted that at no time did the conservators propose a single option to the heritage authorities. Great care was taken to prepare choices for them that would ensure that they were always the final decision makers in a process that was leading towards a programme of conservation of Cambodian cultural and spiritual heritage. As technicians, the conservators prepared viable options and then discussed them with the stakeholders

at every level and changed, updated, and fine-tuned the conservation operation in order to genuinely reflect the needs and requirements of the national authorities and the local communities. The result was that it was agreed upon that the arms should be replaced with new stone ones holding neutral attributes.[9]

The lacquer was cleaned and consolidated first using deionized water and when the deposits were particularly tough a poultice was applied for about ten minutes with an ammonium carbonate solution. In keeping with the ideas that had been discussed with the Achar the lacquer was consolidated using resin that was produced by trees that are now grown near Banteay Srei expressly for the production of lacquer. In this way we were able to follow the request made by the Achar to use natural and local materials.

The tree from which Cambodian lacquer is generally produced is called *Melanorrhea Laccifera* or *Rhus Melanorrhea* and is known in Khmer as *chor mreak*, the Khmer for lacquerware being *khmuk mreak khmer*. It was traditionally used for Buddhist rituals or sacred objects as well as for architectural decoration, furniture, and musical instruments.

Its use can be defined in four different categories; varnishing, polishing, protection known as *leap khmuk mreak*, and decorative lacquer, which is known as *khmuk mreak leap lum or*. Decorative lacquer is the most precious and is used for mouldings; it is mixed with the ash (*pheh*) of rice straw (*cham boeung*) or the ash of palm leaves (*sleuk thnaut*). The ash acts as a catalyst and speeds up the reaction, increasing the amount of lacquer produced (Sitha 2002). It is interesting to recall the inscription mentioned earlier in which the queen speaks of how she mixed the ashes of her burnt hair with the lacquer as an act of piety. This too would have acted as a catalyst and gives weight to the supposition that this lacquer had been applied during the post-Angkorian restoration of the sixteenth century.

The arms were dismantled and iron dowels were revealed that had been fixed with lead while the smaller fragments had been glued on using lacquer with hardwood pins to reinforce the bond. These are all materials that were used in ancient times for restoring and bonding and were clear evidence that the statue had been restored at a much earlier date. The fact that lacquer was applied over some of the joints (that in this case we did not dismantle) showed that the broken statue must have been glued together using dowels and then covered with lacquer. The inscription mentioned above gives us a possible date for this restoration since the queen's inscription is dated by scholars to around 1547.

The arms were carved from local sandstone taken from quarries at Ot Thmor Dop about forty-kilometre northeast of Siem Reap and was kindly donated by the JSA[10]

[9] It was impossible to determine what the statue would have originally been holding since Vishnu can be holding a wide variety of attributes. In any case, it is now almost certain that this is, in fact, an Avaloketisvara that has an even wider spectrum of attributes. It was therefore decided, following further discussion with the Achars and the community, that he should be given a generic neutral object in each hand so as not to falsify anything.

[10] Japanese Safeguarding Angkor directed by Prof. Takeshi Nakagawa that is now called JASA Japan Apsara Safeguarding Angkor.

Project which was working on the Northern Library of Angkor Wat at the time. Local craftsmen from a small local workshop did the carving of the arms, while my colleague Peter Houy and I carved the surfaces that were needed to match the break.

A stainless steel pin that was specially designed by myself and made in Rome was inserted to enable the conservators to ensure a strong enough bond to hold the four arms—since these were very heavy and the contact point at the shoulder is small—of the northern side in place. The ancient restorers coated the pins with lead to protect them from rusting. Unfortunately the upper extremity of the pin had not been covered because the masons had not prepared a blowhole to allow the air to be fully replaced by the molten lead and this caused the formation of an air pocket. This meant that this single part of the pin was in contact with the porous structure of the sandstone and was therefore exposed to humidity, which had caused the pin to rust and swell, breaking open the statue at the shoulder that would eventually lead to the loss of the arms. The conservators were able to use the existing holes, cut by the earlier restorers, thus limiting the impact on the original material as requested by the local community.

Due to the unique nature of this object, and also to the value of Khmer sculpture on the antique market, the head was transported by road from Phnom Penh to Siem Reap under armed guard and in great secrecy. It arrived in the APSARA Authority office in February 2004 where it was kept for one night. The conservators were only informed that same evening that the head had arrived and were instructed to attach it early the next morning and to keep this information secret for security reasons. However, Siem Reap is a small town and news does tend to travel fast and so at six o'clock the next morning when the military escort reached the West Gate at Angkor to deliver the box with the head that it was met by around 200 people (including a full Khmer orchestra and monks from the local pagoda, regardless of the fact that this was essentially a Neak Ta event) sitting in front of the sanctuary before an altar which had been decorated with an abundance of donations (Fig. 5).

The head was taken out of the box and placed before the altar in respect for this devotion and a ceremony was held that lasted for about an hour and a half in which the head was perfumed and blessings were given to all who attended. This was done because at this moment the head was no longer the sole property of the heritage authorities but was being shared with the users or stakeholders, and this moment of return was every bit as important as the actual act of fitting the dowels and applying the glue. It must be said that the moments of reflection followed by the joyous reaction of the people was one of the most moving experiences of my professional career.

Interestingly, there followed a discussion regarding the cement head, which had been removed in order to reattach the original one. It was eventually decided, following a request made by the monks, that due to the fact that it had been venerated for so many years and was therefore considered to have acquired an intrinsic value and should not be thrown away, the cement head would be sent to the southern pagoda of Angkor Wat.

Fig. 5 The altar that had been prepared by the local community to receive the head on its return from Phnom Penh (Simon Warrack)

Follow up discussions with the Achar were revealing. He was very happy with the results of the intervention on various levels. He told us that Ta Reach was now more powerful because the return of the head had restored powers to the statue and these powers give direct benefits to the local community. The head is extremely important in Khmer culture and the head of a divinity is so important that it has its own specific word in Khmer,[11] so the return of the original head had significance on many levels. He also added that the fact that there had been so much activity focused on the restoration of the statue had made the young people in the community become increasingly interested and he had been able to take advantage of this to show them their ancient cultural traditions and to reaffirm their importance and social role. It was also significant that, following the inauguration of the statue, quite a few members of the business community expressed regret that they had not been able to participate in the funding of the operation because this would have given them spiritual credit, and they have recently contributed to the vestments worn by the statue which are now extremely ornate and expensive with the border of the vestment usually bearing the name of the donor. Prior to the restoration operation the statue was shrouded in a simple piece of orange cloth (Figs. 6a, b, 7).

[11] In Khmer the normal colloquial word for head is *kbal* while the word for the head of a divinity is *preah keeh*, moreover, there are another three words which all mean head in the literary form.

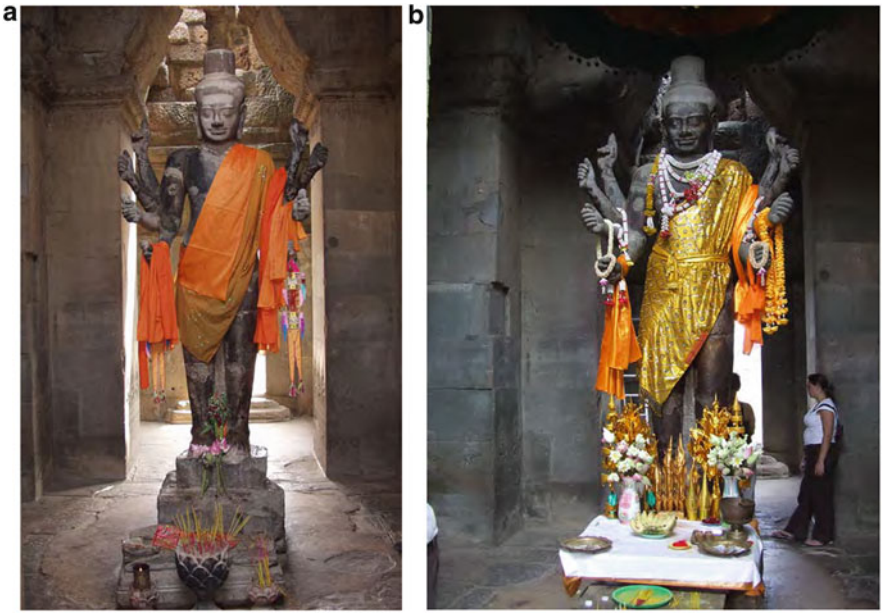

Fig. 6 (**a**) The statue and its vestments before the conservation operation; (**b**) The state and its vestments after the conservation operation (Simon Warrack)

Conclusions

In terms of stone conservation the operations carried out were not particularly complicated, but this operation was much more than a stone conservation operation and in the end much more than the stone was conserved. This operation resulted in the conservation of very ancient local traditions and even though the conservator was not a sociologist or anthropologist the conservation operation did actually reach into these fields.

It is now generally agreed that in order for conservation operations to be truly successful they should be multidisciplinary; however, many disciplines are still only considered if they are 'scientific' and the inclusion of other more diverse disciplines that might, initially, seem to have less to do with a conservation operation tend to be frowned on by pure scientists.

Thus, in the same way that in the early twentieth century the colonial authorities, to all intents and purposes, ignored the fact that they were intervening in a situation where an autochthonic culture was still active (compare the contributions of Sengupta, Falser, Weiler, Pichards and Guillou in this volume), modern scientists should recognize the relevance of the role that needs to be played by all sorts of different experts when working in a living site, if that living site is to be truly conserved.

Fig. 7 Detail of the ornate robes including the name of the benefactor and the amount he spent on the donation (Simon Warrack)

The success of this intervention has been influential and is, in a small way, an indicator of how the change from a purely archaeological, scientific, and scholastic approach to what can be defined as a holistic or integrated approach, is not only possible in theory but also in practice. It would be possible to see this as simply a change from a colonial European approach to a liberal European approach, in other words, a continued imposition of a Eurocentric approach on an Asian reality; but the real indicator of the feasibility and success of this approach has been in the reaction of the Cambodian people on every level and, in particular, from those in the local community. It has now been eight years since the intervention was concluded and I still visit the communities in Trapeang Sheh; the reaction is always pleasing and lively and there is always something new to learn from the various Achars there. Moreover the heritage authorities in Cambodia have seen the impact that this has had both on an international and local levels, not least because, as noted above, they have observed the interest taken by the business community in contributing to this kind of operation since it fits in with the ancient tradition of donating to a religious community in order to acquire spiritual credit. This is common in local pagodas but naturally the opportunity to acquire credit through the King of the Ancestors in the heart of Angkor Wat is an issue that could provide interesting possibilities for the future and perhaps also provide a new angle on the concept of sustainability.

The experts need not only be the technicians from top Western universities and institutes but can also be the national experts and the community leaders and villagers, as in the case of the research that was carried out on Ta Reach. The information provided by these experts can be every bit as important and decisive in defining a correct conservation operation as that provided by a conservation scientist. It is up to the conservators not only to create a truly diverse team and to assess and integrate the data generated, but also to further develop the capacity to listen. This will give more authority to the conservation programmes that are implemented in the future because it will ensure that they have the support of those who have grown up in and around the temples and use them, authentically, every day. If they truly become part of the conservation process, ultimately, conservation will actually become sustainable and the quality of the temples, contemporaneously with the quality of life of the communities whose ancestors created them and who still use them today, will improve.

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Part VI
Memorializing Archaeology: Archaeologizing Memory

Today's Pagan: Conservation Under the Generals

Pierre Pichard

Abstract Since 1995, reconstruction of the eleventh to thirteenth-century city of Pagan has been carried out on a large scale. Under the orders of the military regime, in spite of missing evidence for their original appearance, some 2,000 brick monuments have been completely or partially rebuilt over the exposed foundations of the ancient ones. Funded by public donations within Burma and by monetary contributions from Buddhist associations abroad, this activity—widely criticized by the international community—should also be considered within the context of the Burmese religious perspective.

Keywords Pagan • Cultural heritage • Conservation • Reconstruction • Archaeology

Pagan and its Monuments

Pagan was the capital of the first Burmese empire from the eleventh to the thirteenth century CE. This ancient city is located on the east bank of the Irrawaddy, the great river that crosses the country from north to south. During these three centuries more than 3,000 Buddhist monuments were built on the site, successive kings and other high personages built the largest ones, while a great number of small temples and stupas were collectively and anonymously founded by the local population. The aim of this widespread building fervour was to acquire merit for the donors in order to ultimately progress on the Buddhist path through one's future lives. These intentions were clearly spelled out in numerous contemporary inscriptions.

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Fig. 1 The south-eastern sector of Pagan with temple 534 Sapwetin at centre, 1985 (Pichard 1985)

Pagan lies in the so-called dry zone of Burma where the monsoon rains are intercepted by the Arakan Mountains. Although the arid climate prevented rice cultivation, foodstuffs were brought from far away along the river, upstream as well as downstream. The absence of tropical rain explains why so many monuments have been preserved throughout the centuries and in particular why a large corpus of mural paintings, unique from that date in Southeast Asia, is still visible inside more than 300 temples.

The monuments are widely scattered on the alluvial plain, either grouped in clusters or isolated in the middle of open fields without any obvious traces of alignment or visible urban planning (Fig. 1). The site measures roughly ten kilometres from north to south and eight kilometres from west to east (Fig. 2) with hill ranges crowned by stupas that mark the site's boundaries on the eastern and western horizons. Some 70,000 people live in the area, half in the town of Nyaung U and the other half in a number of scattered villages containing farmers' houses built of wood and bamboo; indeed, the same construction materials were used for dwellings during the Pagan period. This explains why today the ancient domestic quarters of the capital have completely vanished. As a result, the site appears as a wide cultivated plain where only brick monuments of various sizes and shapes scattered among the fields of millet and sesamum recall the ancient royal capital. The heart of the royal capital is located on a bend in the river in a small area protected by a city wall and a moat. Temples, court buildings, and the king's palace were located inside the city walls. These structures were built of wood and are no longer extant since the river eroded the western end of this walled city centuries ago.

A Chinese army overthrew Pagan in 1287 and subsequent Burmese dynasties established their capitals in other locations. However, Pagan was never a deserted city: a few major monuments were actively maintained and regularly visited by

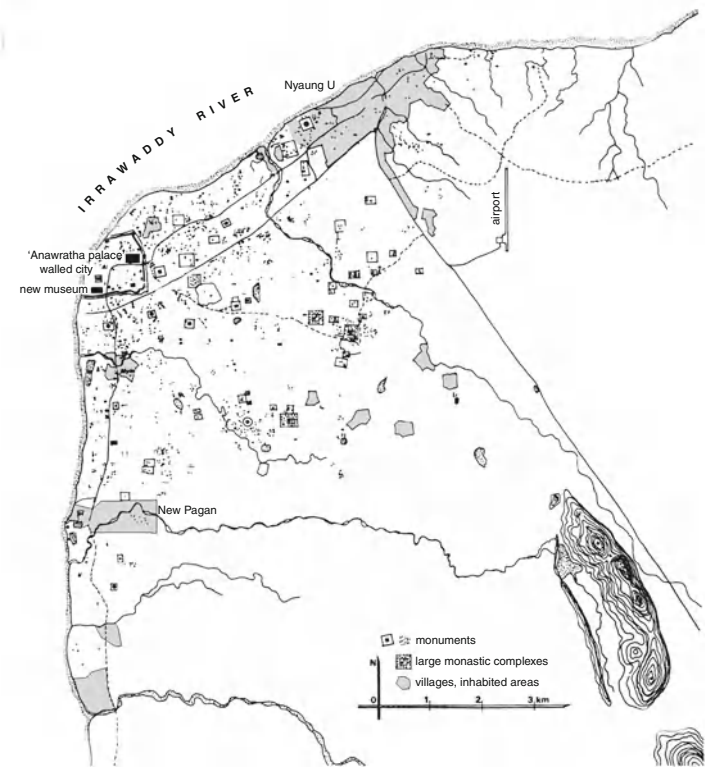


Fig. 2 Map of the Pagan site (Pichard 2010)

Burmese pilgrims. Several monasteries always remained in use and new monuments were even erected during the following centuries, but as the population decreased drastically the vast majority of buildings were left unattended and were allowed to weather and deteriorate.

During the colonial period the British carried out conservation measures on a limited number of monuments; first, under a local branch of the Archaeological Survey of India, then after 1931, under the newly founded Archaeological Survey of Burma. Under the enthusiastic leadership of Gordon Luce (1889–1979), English and Burmese scholars began the historical and architectural study of the city.[1]

[1] Editor's note: For the British colonial strategies of 'archaeological heritage' compare the contributions by Sengupta and Weiler in this volume. A link to the French-colonial strategies in Angkor is discussed by Falser, Luco and Guillou discuss the land use practices of the local population on archaeological sites and beyond under colonial, post-colonial, and globalized politics.

The 1975 Earthquake and Aftermath

Pagan lies in an active seismic zone and the chronicles record damage from a number of earthquakes between the twelfth and the nineteenth centuries. In fact, several ancient inscriptions mention post-earthquake repairs to buildings and Buddha statues.

The last earthquake on 8 July 1975 affected most of Pagan's monuments to various degrees. Structural damage included dislocation of walls as well as the collapse or cracking of vaults and arches. Several cases of partial collapse occurred but fortunately total collapses were the exception. Superstructures and vaults were generally the most damaged parts; in addition, many square feet of mural painting and stucco carving fell down and were definitively lost.

Burmese authorities were assisted by the population in carrying out the clearing of debris and various emergency measures. A special budget was allocated by the government and augmented by voluntary financial support that came from people all over Burma; in addition, an advisory board was nominated to issue directives and coordinate repairs and restoration.

The extent of the damage and the large number of monuments affected dramatically increased the workload of the Department of Archaeology, which was already short on manpower and equipment. A priority list of urgently needed repairs was drawn up that focused on forty four monuments selected from among the best known, most revered, and most badly affected. At the request of the Burmese government, UNESCO provided my services as a consultant (Pichard 1976). Acting on my advice, UNESCO provided the most urgently needed equipment during the following years, and Japan, Germany, and France supplied technical and financial assistance.

An UNDP–UNESCO project was approved in November 1980 to assist the Burmese authorities in the conservation of the country's cultural heritage. Preliminary studies included a seismological investigation and a structural analysis of fifteen selected monuments. A strengthening project to be progressively implemented was then designed for some pilot monuments. The aim of this was to test the validity of the proposed methodology and train local teams. One temple was selected as a pilot monument for the conservation of mural painting and stucco carving. At this temple several workshops were initiated in cooperation between local and foreign experts.

The conservation strategy aimed at striking a balance between the structural strengthening of the most important monuments, maintaining as many monuments as possible, and conducting timely repairs in the most urgent cases. The priority was to consolidate the buildings that were still standing but were weakened by masonry cracks or partial collapse. Monuments that had already collapsed before 1975, which survived as mounds of bricks and debris, were left untouched since they did not present a risk of continued damage.

By 1988 the structural integrity of the most important and critical monuments had been restored and a master plan for the whole area was being prepared, including a management plan to deal with new construction and an expected

Fig. 3 June 1990. Ordered to demolish their own houses, the villagers of the walled city wait for army trucks to transport the materials to New Pagan. In compensation each family received one kilogram of nails to rebuild their homes (Pichard 1990)

increase in tourists. These issues were specifically discussed by both Burmese and international experts during a workshop organized in Pagan in 1988 by the Sophia University of Tokyo (Ishizawa and Kono 1989). Unfortunately, this long period of constructive international cooperation was coming to an end.

Following the national uprising of 1988, a new generation of military leaders came to power and began to implement drastic measures on several historical sites in Burma, beginning with Pagan.

Between April and June 1990 some 5,200 inhabitants of Pagan, the entire population that has been living in the walled city for generations, was deported to an open site—New Pagan, which was located five kilometres to the south but was still within the historical area. No official reason was given for this arbitrary expulsion or for the forced destruction of houses by their own inhabitants (Fig. 3). At the same time the Department of Archaeology was ordered to initiate immediate large-scale archaeological excavations, which left no time for the preliminary planning and protection, supervision, and scientific recording to be properly carried out. In describing the government's activity as 'blitzkrieg archaeology,' the well-known Burmese historian U Than Tun did not mince his words; he further declared that 'By any standard of archaeological excavation and restoration, the work done was ignoble' (Than Tun 1998, 37). Than Tun's great national reputation alone shielded him from retribution. For other Burmese, criticism of the government's plans for Pagan would have likely brought sharp reprisals.

In December 1989, the Burmese government approved a new project for the conservation of Pagan, which was to be funded by UNDP and implemented by UNESCO. This included the preparation of a master plan for the development of the Pagan archaeological area. UNESCO was not consulted prior to the eviction of the local population, which was never discussed during the preparatory meetings and was ordered by the military government before any secure plan could be drafted. Although Burmese authorities hinted that the eviction was initiated on UNESCO's recommendation, in fact the Assistant Director-General of UNESCO sent a letter to the national government dated 11 September 1990, requesting that the authorities abstain from all actions affecting the condition of the site until the approval of a master plan.

In 1993, a *Myanmar Cultural Heritage Preservation*, *Restoration and Conservation Central Committee* was set up at the national level under the chairmanship of the Secretary Number One of the regime, then known as SLORC (State Law and Order Restoration Council), to organize and coordinate conservation activities throughout the country. The Director-General of the Department of Archaeology announced that the committee had approved a proposal for the protection of the Pagan archaeological area based on a preliminary zoning map (Pichard 1992) and indicated his eagerness to finalize the master plan in conjunction with a new UNESCO project that was to be implemented using a trust fund from the Japanese government. He gave his assurance that no new action would be implemented before the approval of the plan. Nevertheless, several agencies (Departments of forestry, agriculture, highway, and public works) were carrying out various activities in the archaeological landscape without proper coordination, including the creation of plantations, the building and widening roads, the levelling of agricultural land and the destruction of protective hedges, and the setting up of new buildings and fenced compounds.

From Beautification to Reconstruction

In 1995, the government launched a national campaign in press, radio, and television to raise funds for the restoration of Pagan through public donations. A large amount of money was collected from commercial enterprises as well as from individuals, an outcome to be expected when the aim is the repair or erection of sacred Buddhist buildings. In addition, sizable contributions also came from abroad, from Burmese expatriates as well as from Buddhist associations in Korea, Japan, Taiwan, and Singapore. Due to this influx of money, large-scale building activity in Pagan took shape in two ways.

The first was beautifying the monuments by rebuilding their collapsed parts. Many buildings had lost their superstructures, finials, and roof ornaments during the 1975 earthquake or in the centuries before, the exact shape and design of these disappeared parts was unknown. Despite this the temples and stupas were all completed by the reconstruction of new elements that duplicated similar ones in

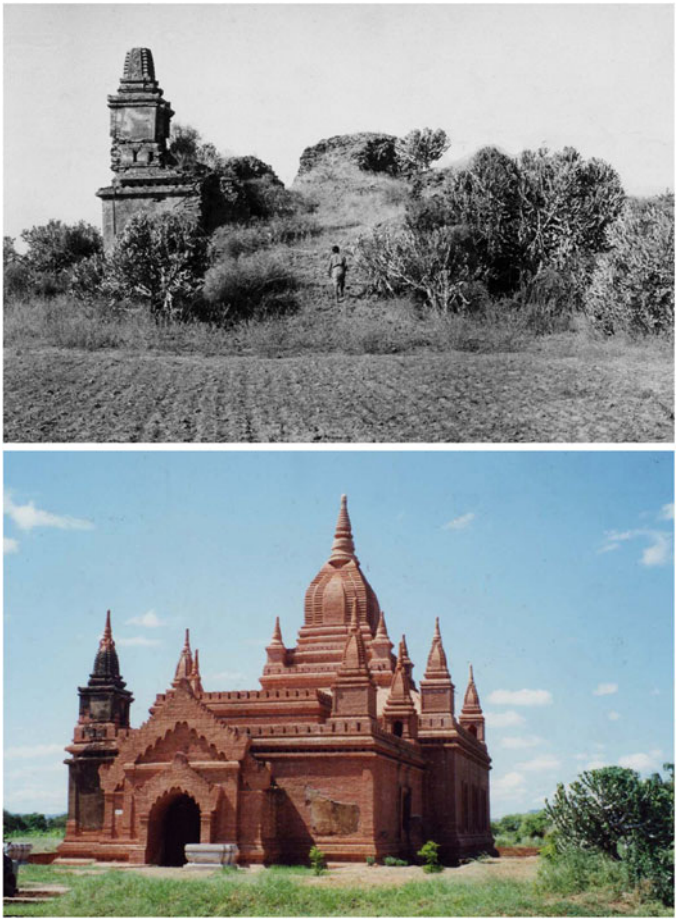


Fig. 4 Temple 820, Pagan. *Top*: Condition in 1985; *Bottom*: In 2001 after the beautification of three-quarters of the monument and all of its superstructures (Pichard 1985, 2001)

the same building when possible, or copied from another monument (Fig. 4). This approach has serious technical risks, particularly in a seismic area, since the systematic reconstruction of collapsed superstructures without strengthening the walls below significantly increases the vulnerability of the monuments by adding an extra load onto already weakened walls. In only a few cases did this beautification process represent a real structural improvement (Fig. 5).

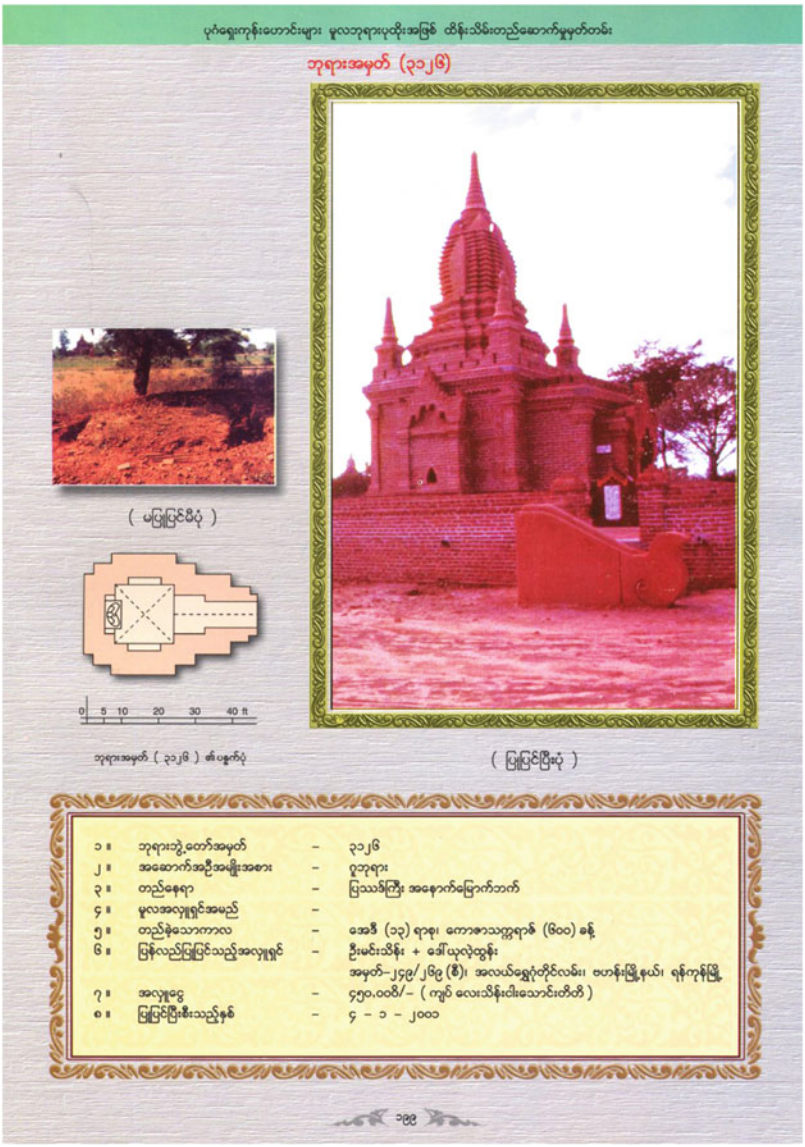
The second way in which this new building activity took shape was in the reconstruction of buildings that had totally collapsed. In Pagan more than 1,000 brick mounds covered with shrubs were scattered in the fields. The Department of Archaeology was ordered to clean away the debris in order to expose the foundations of former buildings. These structures often comprised no more than their base with a few courses of bricks, which gave a general sense of a typical

Fig. 5 Stupa 770, Pagan. *Left*: Condition in 1987 (Pichard 1987); *Right*: In 2006 after beautification. In this case, the reconstruction of missing parts has certainly prevented a future collapse of the monument. The details and proportions of the reconstructed parts are, of course, conjectural (Berliet 2006)

ground plan on which a fresh new monument could be built: if a door was observed, then the original structure was deemed a temple (Fig. 6), and if the bricks formed a simple square base, it was considered a stupa.

After clearing the debris and exposing the foundations, the Department of Archaeology produced a file showing the plan, elevation, and section of the proposed new structure and a price quotation for its construction. A choice of buildings of various sizes and budgets was then proposed to donors, and a contractor was selected to carry out the actual work (Fig. 7). Eight local contractors, mainly former members of the department, specialized in these works. As a result, for over ten years this building activity was a major source of income and the main economic activity in the area; indeed, between 1995 and 2008 as many as 1,299 monuments had been completely rebuilt and 688 partially rebuilt, some on more than half of their structure (Hudson 2008). The number of monuments restored is now recorded on a large permanent sign outside the museum at Pagan (Fig. 8).

Obviously, in these reconstructions the reliable archaeological evidence is extremely poor. Wide architectural diversity existed among the thousands of monuments at Pagan, and temples and stupas even with the same ground plan had very different elevations, superstructures, and decorative elements. The reconstruction of so many buildings is restricted to a few models or prototypes that are reproduced *ad nauseum* throughout the site. The result is that highly similar structures now dot the landscape with a tedious uniformity that does not



ပုဂံရွေးကုန်းဟောင်းများ မူလဘုရားပုထိုးအမြစ် ထိန်းသိမ်းတည်ဆောက်မှုမှတ်တမ်း

ဘုရားအမှတ် (၃၁၂၆)

(မမြြင်ပီပုံ)

0 5 10 20 30 40 ft

ဘုရားအမှတ် (၃၁၂၆) ၏ပန်းကန်ပုံ

(ပြြင်ပြီးပုံ)

၁ ။	ဘုရားဘွဲ့တော်အမှတ်	–	၃၁၂၆
၂ ။	အဆောက်အဦးအမျိုးအစား	–	ဝဘုရား
၃ ။	တည်နေရာ	–	ပြဿနာကြီး အနောက်မြောက်ဘက်
၄ ။	မူလအလျားရှုရှင်အမည်	–	
၅ ။	တည်ဖဲ့သောကာလ	–	အေဒီ (၁၃) ရာစု၊ ကောဇာသက္ကရာဇ် (၆၀၀) ခန့်
၆ ။	ပြန်လည်ပြုပြင်သည့်အလျားရှုရှင်	–	ဦးမင်းသိန်း + ဒေါ်ယုလဲ့ထွန်း အမှတ်–၂၄၉/၂၆၉ (စီ)၊ အလယ်ရွှေဂုံတိုင်လမ်း၊ ဗဟန်းမြို့နယ်၊ ရန်ကုန်မြို့ အမှတ်–၄၇၀,၀၀၀/– (ကျပ် လေးသိန်းငါးသောင်းတိတိ)
၇ ။	အလှူရှင်	–	
၈ ။	ပြုပြင်ပြီးစီးသည့်နှစ်	–	၄ – ၁ – ၂၀၀၁

Fig. 6 Page 199 of *Bagan Ancient Mounds as Original Monuments*: *Record of Reconstruction and Renovation* published by the Department of Archaeology in 2001: *Left*: a photograph of the site in its former condition, with the unearthed base of walls, some thirty centimetres high, and a plan of the reconstructed temple. *Right*: the reconstructed temple, with a white stele near the door bearing the name of the donors (Source: Department of Archaeology 2001)

Fig. 7 View of Pagan from the southeast. In the foreground, two temples under complete reconstruction over their original foundations (Pichard 2001)

Fig. 8 At the entrance of the new Pagan museum, a stele proudly records the number of monuments 'renovated' by the regime (Stadtner 2006)

accurately convey Pagan's diverse architectural history. In addition, the quality of work and materials is generally low, and the commercial bricks commonly used and unplastered are an unsuitable colour. Stadtner observed that the new pink coloured monuments look like 'plucked chickens amidst the ancient shrines' (Stadtner 2005, 73). Such completely conjectural reconstruction on this scale is, of course, in opposition to all internationally accepted standards of architectural conservation. A Burmese archaeologist noted: 'Your inventory (i.e. Pichard 1992–2001) is very valuable now, because it shows the monuments before beautification!' But a devotee will not look for theoretical authenticity, it is

much more important for him to see Buddhist temples in good condition, new or old, and nobody will criticize constructing or repairing such monuments. Indeed, a Thai art historian once commented to me also: 'You will never convince Asian people that there is beauty in a ruined building.'

The beautification of Pagan also takes place within a wider context of religious constructions that are noticeable all over the country. Several monks have attained great fame in Burma by initiating monumental projects, such as the largest statue in the world of a reclining Buddha at Mudon, which is 180 m long, or the standing Buddha at Bawdi Tahtaung, which rises 150 m high and is surrounded by 5,000 Buddhas who are each seated under a sacred tree (Rozenberg 2005).[2] Nor are the generals the last to openly participate in the field of building monuments, as evidenced by the construction of a gigantic stupa in their new capital, Naypyidaw. But they cannot be blamed for that, for while Than Shwe, the head of the regime, outraged everybody with the extravagant amount he spent on the marriage of his daughter, the same people cannot but be impressed by his equally vast expenditure on religious foundations. Of course, the military leaders exploit this asset in an attempt to fortify their legitimacy using Buddhism as an 'enculturing rule-based transactional system' (Houtman 1999), but as Buddhists, they are also eager, like their royal models, to redeem the dubious actions of their present lives through good deeds (Rozenberg 2009).

Unseemly New Landmarks

Two huge structures recently built by the military regime tower above the walled city. The first one is a museum built in 1995–1998 to replace the previous site museum of the 1970s, which was a well-designed unobtrusive building that was perfectly scaled to its function. The new museum is two storeys high under a three-tiered roof (Fig. 9) and is so wide that the archaeological exhibits occupy only a few badly lit rooms beside a cavernous hall where statues of ancient Pagan kings are highlighted (the labels fail to record that these are modern images, which might lead uninformed museum-goers to believe that they date from the ancient period). The second structure, built between 2003 and 2008, is intended to represent the royal palace of Anawratha, lived in by the first king of Pagan (reign CE 1044–1077). Since its original appearance and location are unknown, the building follows the same 'neo-classical Myanmar'-style (Fig. 10) as the museum and is vaguely inspired by the nineteenth-century royal palace of Mandalay (destroyed during World War II, but well documented by survey and photographs and also rebuilt

[2] Editor's note: The role of religious leaders during the initiatives to rebuild (here) or help restoring religious structures and sculptures in relation to Western restoration technology and methodology within the paradigmatic change towards 'living heritage' is discussed by Warrack in this volume.

Fig. 9 The Pagan museum, inaugurated on 17 April 1998, close to Gawdawpalin temple 1622 (twelfth century CE), one of the largest temples of Pagan (Pichard 1998)

Fig. 10 The purported palace of Anawratha built from 2003 to 2008 in the centre of the walled city (Pichard 2012)

after 1991). However, unlike the Mandalay palace, which was originally built in wood, the replicas at Mandalay and Pagan are reinforced concrete structures partially covered by teak plywood and yellow paint. The Pagan palace has no practical use and is presently closed to visitors. It is impossible to find a justification for its costly construction besides the one given by the generals: to increase the nationalism and patriotism of the population.

A Multifaceted Site?

In 1996, Burma presented a tentative list of eight sites, including Pagan, to the UNESCO World Heritage Centre. The full nomination forms were, however, never submitted and at the time of writing there is still no Burmese site included on the World Heritage List. Clearly, the Burmese regime did not wish its sites to be included, probably in order to avoid external inspections and subsequent criticism by the international community.

In almost every respect Pagan's recent history can be considered as an anti-Angkor: the master plan was never finalized, the recommendations of UNESCO were generally ignored, and the involvement of international experts were restricted to technical assistance, and this was only during the years immediately following the earthquake. There is, of course, a wide environmental difference between the two: forest surrounds the Angkor monuments, whereas cultivated fields surround the Pagan ones. The farmers, arguably the best conservators of the landscape, live in several villages within the historical site and even New Pagan, where people were relocated in 1990, is located inside the site limits.

But the main reason behind this contrast lies in the religious context: while in both countries the great majority of the population adheres to Theravada Buddhism, the Angkor monuments are Hindu temples dedicated to Shiva or Vishnu. In Pagan, however, the monuments are Buddhist, and unlike in Cambodia, the Burmese view the monuments of Pagan as timeless acts of devotion that use the same religious imagery that is commonly depicted all over the country. Contributing to the reconstruction of these collapsed Buddhist temples and stupas is thus a way to manifest one's continued faith in Buddha and to acquire merit.

Today the site of Pagan is viewed from very different perspectives. For most Burmese people, such as the pilgrims and devotees, Pagan is primarily a sacred Buddhist place of worship, a field of potential merit (Fig. 11).

For foreign archaeologists and purist restorers, it has been defaced and reduced to a Disneyland. For tourists, it is a pleasant site where one can go from temple to temple by bicycle and enjoy beautiful sunsets. For the military leaders, Pagan has become a sort of pleasure park where one may play golf and savour a good dinner at the top of the observatory tower. As for the local people, well, they would prefer to see more money from more foreign tourists. Although many among the educated elite in Burma privately bemoan the beautification of Pagan, preferring the rustic supposedly historic look that they recall from their childhood visits, open criticism of Pagan's rebuilding remains unthinkable in today's Myanmar.

Pagan has been completely isolated from the sophisticated discussions of globalized archaeological correctness. The rebuilding of Pagan over the last few decades reflects the inescapable problems of Burmese society under the present regime.

Fig. 11 A cluster of thirteenth-century monuments in Pagan. Two small reconstructed temples in the foreground shelter new Buddha statues and a third is in construction. Behind, temple 1554 and stupa 1555 show various levels of supposed beautification (Pichard 2001)

Postscript: Pagan in 2012

With the recent political evolution in Myanmar and the opening of the country to the international community, new trends are emerging in the cultural field, including an approach by UNESCO that aims at securing the nomination of selected sites in the World Heritage List. A first application for three Pyu cities, Sri Ksetra, Beikthno, and Halin, is already being completed, and preparatory steps for the Pagan site and monuments are under way (Pichard 2012).

Since 2008, beautification and reconstruction are considered completed and donations are no longer solicited. The Department of Archaeology once more pursues its official task, namely the study, preservation, and maintenance of sites and monuments. Recently, several devices have been adopted to strengthen damaged monuments, including metal frames inside or outside, brick buttresses along leaning walls, and reinforced concrete blocks inserted into the ancient masonry. The problem is that all these measures have been carried out in an improvised and empiric way, without a previous, in-depth structural and engineering survey, or a proper diagnostic of the causes of damage, or the necessary technical assistance of specialists. Given the location of Pagan in a seismically active region, this lack of scientific methodology can become extremely harmful. All over the world, examples are known of such empirically added devices contributing to the collapse of the ancient buildings they were supposed to support in earthquakes.

There is now an urgent need to raise the capacity of the Department of Archaeology through professional training and technical assistance, either from other Burmese institutions, such as engineering faculties and the Rangoon Institute of Technology, or from seismic engineers coming from abroad to provide their expertise and experience.

Let us hope that the inclusion of Pagan in the World Heritage List can trigger a positive international response to assist Myanmar in preserving their heritage.

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The Angkorian Palimpsest: The Daily Life of Villagers Living on a World Heritage Site

Fabienne Luco

Abstract Nowadays, traditional Khmer farmers are living on the framework of the ancient capital cities of Angkor, which is also visited by nearly two million tourists a year. They are torn between the aspiration of profiting from the country as it opens to the market economy and to mass tourism, and the restrictions of living in a place that is stagnating into a museum representation. With international heritage developers advocating the re-creation of an ancient idealized space, the solutions offered to the new generation are to either leave the site or to become part of its folklore. In this paper the approach these inhabitants chose when settling in this area whilst developing it within the framework of their living culture shall be taken into consideration. Angkor is not stuck in the past: These populations lay new layers on the partly erased ancient structure. Ancient developments, far from being simply archaeological remains to be preserved, are used on a daily basis in residential, farming, and religious activities. Angkor is not just an archaeological site, it is also a living territory.

Keywords Palimpsest • Living heritage • Archaeological site • Angkor • World Heritage

Angkor, the Myth of the Abandoned City

For the foreign explorers[1] who came between the sixteenth century and the late nineteenth century CE, Angkor appeared to be a forgotten antique city of stone engulfed by the jungle. The ruins evoked the perception of a golden era, which was

[1] Portuguese and Spanish missionaries: Diego Do Couto (1550), Gaspar de Cruz (1556) and French travellers: Father Charles Emile Bouillevaux (1857), Henri Mouhot (1860).

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followed by the ransacking of the city and its subsequent abandonment to the forest in the fifteenth century.

The stone and soil skeleton studied and restored by outsiders. In 1907 Siam retroceded Siem Reap province with Angkor to Cambodia. The French School of Asian Studies (*École française d'Extrême-Orient*, EFEO) had been founded around 1900 to study and to manage the restoration and the conservation of the monumental site of Angkor. Foreign researchers who travelled in the entourage of the French protectorate began the task of piecing together this gigantic puzzle. It was an overwhelming project. The first works carried out by the architects and archaeologists focused mainly on clearing the forest and on recording and restoring the countless remains. They started with the visible remains: a stone (sandstone, brick, and laterite temples) skeleton buried in the forest.

Divinity shrines and remaining engraved inscriptions glorifying the kings left the most visible traces. The first structures dealt with were the stone religious buildings. Architectural, epigraphic, and iconographic studies reveal that this site was home to a succession of royal capitals that reigned over a large territory from the ninth to the fifteenth centuries when the practiced religions were imported from India: Vishnuism, Shivaism, and Mahayana Buddhism.

The dwellings of the local people, built with perishable materials (wood, thatch), as depicted on the temple bas-reliefs did not survive the aggressive climate, the passage of time, and the insects. As a result the subject has been understudied and thus little is known about them. The tale of the journey of a Chinese diplomat, Tchou Ta Kuan (Pelliot 1951), survives as the single surviving account of life at the court of Angkor in the fourteenth century.

More recently, as the restoration and conservation of religious stone constructions continue, researchers have wondered about soil structures (dykes, causeways, water tanks, and canals). They have begun to study the planning of the Angkorian territory through satellite images, test pits, and archaeological excavations, which have exposed the stone and soil framework of the site. Besides the stone temples, living areas have been discovered and analysed, such as a concentrated urban habitat inside Angkor Thom[2] and a scattered habitat at the actual location of the Siem Reap airport (Baty and Bolle 2005). Still, very little is known about daily life in the past (Fig. 1).

In the shadow of the huge remains: *A living place*. Although it has since distanced itself from the old romantic image of a forgotten city that had been abandoned as a capital city, this place named Angkor has lived and thrived throughout middle and recent history—though arguably with less panache (Fig. 2).

Presently, it is difficult to determine clearly if there has been continuity or discontinuity of human occupation in Angkor. According to the local population it appears that the local history has been marked by disruptions such as political

[2] The *Greater Angkor Project* by the University of Sydney is directed by Christophe Pottier, a French mission on urban archaeology is directed by Jacques Gaucher.

Fig. 1 Daily life represented on the bas-reliefs of Bayon temple—twelfth century CE (Luco 2010)

Fig. 2 Local villagers fishing in the moat around the Bayon temple Fishing in Bayon temple moat (Luco 2010)

disorders, which were followed by periods of insecurity resulting in displacements of the local population. We can only say that the populations that currently inhabit Angkor have managed to live on an old framework whose cultural codes do not seem to be foreign to them.

Occupation of the site is attested to at different modern periods. In the sixteenth century, the Royal Chronicles mentioned that several kings moved the court back to Angkor Thom for a short time. They carried out the restoration of some sections of Angkor Wat and finalized some bas-reliefs and the building of Buddha statues, notably at the Baphuon and at the top of the Phnom Bakheng. Several remains of terraces in Angkor Thom testify to the later addition of Buddhist monasteries constructed in wood. The fame of Angkor Wat[3] as a sacred Buddhist site attracted pilgrims from far away destinations. A Japanese merchant even drew a plan of it as early as the late sixteenth century CE (Dagens 1989).[4]

When explorers came at the end of the nineteenth century CE, Angkor was not a completely abandoned jungle. These explorers mentioned villages and monasteries but did not really take any interest in the social, religious, or farming practices of the site dwellers, which were deemed decadent when contrasted with the site's glorified past.[5]

The Angkor site is now mostly considered an archaeological and tourism area. But far from being merely a fossilized site from the past, it is also a present living place. Visitors to the site often do not notice the groups of fruit trees (sugar palms, mango trees) growing between the temples, a sure sign of past or present human settlements (Fig. 3). Likewise, set back from the circuit roads and going mostly unnoticed are eighty-five villages with a combined population of nearly 100,000 that are settled in the extended site of Angkor covering an area of 401 km^2.

The Angkorian Palimpsest: Living on the Traces of the Past Settlers

Daily life for those living in these rice farming villages remains traditional, and numerous contemporary gestures seem to reproduce those seen on the temples' carved bas-reliefs, for instance: habitation in wooden houses on stilts, transportation using ox carts, market scenes, fishing, and cooking practices. However, these activities can be seen not only in the precinct of the Angkor site but also in the practices of neighbouring inhabitants. The specificity of the people living in Angkor is that they live within an archaeological landscape and have used it continually for their habitation, water needs, and religious practices. They have added a new layer to the old half-erased one (Luco 2000, 2001, 2005a/b, 2006, 2007).

[3] Furthermore, this temple did not wait for the French to become the geo symbol of the country. The image of the temple had already been used as a symbol on a seal and on coins in the middle of the nineteenth century.

[4] Supposedly one of the earliest sketch plans of Angkor Wat by this Japanese visitor was published in 1923 in *BEFEO* XXIII, 119–126.

[5] Compare the contributions by Sengupta and Falser in this volume.

Fig. 3 Bakheng village (Luco 2011)

Natural environment restrictions: *The management of water*. As already highlighted by the geographer Jean Delvert (1994, 44), the characteristics of the Cambodian climate include "a tough dry season" and a "lack of regular rainfalls." Therefore, water management (whether abundant or scarce) throughout the year is of paramount importance. Seen from the sky during the monsoon, the settlements in Cambodia look like huge inundated rice plains from which knolls, hills, and causeway dykes emerge. There is no irrigation system here that could make up for the lack of regular rainfall. The farmers are dependent on the weather factor to yield a harvest.

The main concern of the inhabitants is finding emerged soils to build houses that are safe from the floods and to find nearby low flat lands to hold rainwater for wet rice cultivation. The location selected for the settlements must also take into account the rigors of the dry season. The presence of a nearby water reservoir either on the ground or just beneath it is therefore vital. The solutions to these dual constraints are either to find emerged land near a water supply, which can be accessed all year round (a river or pond), or to shape the landscape (Delvert 2001).

Taking advantage of a shaped landscape in Angkor: *The use of high grounds for habitation*. On the Angkor site, present-day dwellers have been able to take full advantage of the reliefs shaped by ancient developments. Huge architectural and hydraulic developments have drastically changed, shaped, and scarred the landscape with folds, holes, and bumps: causeway dykes, earth levies around the huge water reservoirs (*baray*) and ponds (*tropeang*), and manmade mounds. These places are ideal for the settlement of rice farming families. The population lives on the higher ground and takes advantage of the easy access to water for their domestic needs.

Thus, long strips of houses stretch along the non–flooded lands of the Angkorian framework: the dykes of the eastern *baray* (Thnol Toteung, Thnol Bandoy villages) and western *baray* (Kok Beng, Kok Thnôt villages), and raised roads on dykes (Bo Em, Kirimenuan villages).

Taking advantage of a shaped landscape in Angkor: *The use of the low lands for rice cultivation*. This developed landscape is also favourable for rice farming, even if the mediocre quality of the soil does not produce strong yields. The deep ponds and moats (the *tropeang*, ancient ponds, in the Angkor Thom moats; inside the eastern *baray*; and in the inner and outer peripheral canals of the eastern *baray*) keep in the rainwater for a sufficient duration, so that rice can be farmed late and for a better yield.

Taking Advantage of a Sacred Framework

The construction of monasteries beside Angkorian temples. The remains of stone and brick temples strongly mark the landscape. The abandonment of Angkor as the royal capital corresponded with religious changes. Theravada Buddhism replaced the official Brahmanic and Buddhist Mahayana religions. This new religious cult was organized in an empty space where congregations gathered and could not take place in filled spaces such as ancient mountain temples or the labyrinths of the galleried temples. These spaces thus fell into disuse. Besides this, as indicated in construction traditions, once a building started showing signs of fatigue or if any misfortunes occurred, construction was abandoned to make way for new works. Therefore, places filled with the miasmas of the past were not restored and buildings were left to allow natural decay to complete the demolition work. However, these places were already consecrated and as such they were still considered to be full of supernatural power, even when in ruins. Indeed, contemporary Buddhist monasteries are usually built next to ancient temples, as if wanting to benefit from their older sacred presence. This is also the case with the monasteries located on both sides of Angkor Wat and of those more recently built in the precinct of Angkor Thom. Indeed, a total of eleven monasteries have been built in the Angkor monumental zone.[6]

The cult of the land spirits: *The* neakta. The stone remains were not completely abandoned. In the enclosure of the temples and in the Angkorian landscape, traces of cults can still be observed, particularly in the alms that are left in front of statues, or carved stone fragments (Fig. 4). This is part of an indigenous cult which is a composite of several Brahmanic and Buddhist divinities and ancestor spirits.

[6] Editor's note: How social and religious practices on heritage sites are continued and become part (or do not become part) of technical decisions of restoration is discussed by Warrack, Chermayeff, and Pichard in this volume. These approaches need to be set in relation to the new simulation techniques of 'archaeological dead ruins' as discussed in this volume by Gruen, Nguonphan/Bock, Toubekis/Jansen, Cunin, and Sanday. The continuing power of spirits on the ancient land of the Khmer from a post-genocide phase in Cambodia is discussed by Warrack and Guillou in this volume.

Fig. 4 *neakta* land spirit—south gate of Angkor Thom (Luco 2010)

Angkor is said to be controlled by land spirits (*neakta*) that are organized within a hierarchy rooted in the territory. If Buddhism looks to the future and the forthcoming incarnation, the cults dedicated to the land spirits are believed to affect daily life. The *neakta* act as ancestors guarding a territory and punish those who act mischievously by cursing them with illness or calamity. However they also reward those who honour them. Villagers communicate with *neaktas* through a medium. Represented by a stone or fragment of Angkorian statue, the *neakta* are believed to be located in ancient habitats that are now abandoned; that is, inside a temple or on the boundary of the present-day village. Lesser *neakta* guarding small spaces are supervised by a greater *neakta* that controls several villages. These, in turn, are under the authority of the great protector of Angkor territory, *Ta Raj*, who lives in a Vishnu statue located in Angkor Wat (Fig. 5) (compare Warrack in this volume). However, the *neakta* cult is becoming gradually less important. As old medium die and are not replaced, the *neaktas* are also disappearing. Statue smugglers loot their materialized images and their shelters fall into decay and are not rebuilt.

Echoes of Angkorian temples: *The ephemeral temples*. A study of the decoration of the great Angkorian temples highlights representations of vegetal structures made in wood and decorated with flower foliage. Echoing these forms carved in stone, vegetal ritual constructions are made in villages during domestic ceremonies such as the construction of a house, cutting the tuft, cremation etc. The mount Meru, as it is magnificently represented in the Angkor Wat towers, can also be seen in the shape of the sand mounds that are made for religious ceremonies (Fig. 6). Shaded by the great stone temples, these ephemeral temples recall that a culture can live when it conveys—even when reformulating it—the vocabulary of its identity.

Desacralizing Angkor: *Control of religious practices*. Although the local populations and many visitors consider Angkor a sacred site, since the late 1990s

Fig. 5 Ta Raj in Angkor Wat (Luco 2010)

Fig. 6 Ephemeral temple (Luco 2010)

Fig. 7 Korean tourists making offerings to Preah Ko statue, Phnom Bakheng (Luco 2010)

some of the religious practices in the temples have been tightly controlled if not expressly forbidden. For instance, the expansion of Buddhist monasteries has been drastically controlled and private religious ceremonies are currently restricted (compare Miura 2004). Those serving popular religious practices, such as mediums and fortune tellers, were also driven out of the Angkor Wat galleries.

But one may still observe that whilst layers of the palimpsest of these sacred places fade, others are added. Religious life still finds a way to survive through statue adoration, in particular at Angkor Wat and at the Bayon. This is due to mainly non-local populations made up of mostly Asian tourists (Fig. 7). Thus Angkor, far from being merely a tourism park turned into a museum (compare Falser's contribution in this volume), must also be considered a living and religious site where contemporary expressions of these activities must be acknowledged and not discouraged.

Failed Meeting Between the Local Population and the Outside Developers

The past. The relationship between the villagers and the non-local developers has been from the outset riddled with misunderstandings. The French assessment was Western biased, favouring written and oral knowledge over gestures. The local

populations were considered ignorant as they did not write down any history of Angkor and could not read the inscriptions, and the French overlooked the other types of silent communication that form daily practices.

Requisitioning coolies. However, the villagers had one important asset they provided very useful manpower to move stones and clear the areas surrounding the temple. The first so-called coolies requisitioned were forced labourers. After trying out prisoners, the Angkor conservators finally decided to remunerate the labour in order to develop worker loyalty among the local population.

Relocation of villages. In the early twentieth century the French were the first to name the site an archaeological park. Their concern regarding the preservation of what was called the 'ruins' and hydraulic development were not in accordance with neighbouring villager activities and the populations living too close to the Angkorian remains were quickly considered a disturbance. The solution was simply to relocate them. Relocation started with the eviction of a few dwellers from hamlets located in the precinct of Angkor Thom. Their houses were dismantled and relocated in the nearby villages of Angkor Krau, Kok Beng, and Ta Chan. The monasteries located in front of Angkor Wat were also moved to the sides. In the mid-1950s, development works in the western *baray*[7] were carried out. The aim was to increase water storage capacity. The villages located inside had to be removed. Kok Thnot, Kandal, and Baray villagers dismantled their houses and created the villages of Kok Thnot and Kok Beng, located on the northern dyke of the *baray*. The villagers located opposite Angkor Wat (Tropeang Ses, Veal, and Teaksen) were relocated in the early 1960s to lands close to the airport. After the Khmer Rouge fell in 1979, they settled back onto their ancestral land before being again displaced in the early 1990s to lands located north of Siem Reap, a place that became the Phum Thmey or 'new village.'

The Current Situation

The Rapid Opening to International Regulations and Mass Tourism. The early 1990s marked a turning point for the site, namely the inscription of Angkor to the World Heritage List in 1992 and the internationally recognized national elections in 1993, which resulted in opening up Cambodia to large-scale international aid. At Angkor, the inscription onto the World Heritage List and the regulations that ensued—the opening to mass tourism and to development—have produced new social and economical impacts on the local population (Fig. 8) (Winter 2003, 2007).

Site developers have again questioned the traditional occupancy practices (mentioned above) of the Angkorian spaces (compare the analysis of historic villagescapes in and around Angkor in Martel (1975)). Angkor has become a place for often antagonistic debates in which the equation between the protection of the

[7] A huge Angkorian water tank.

Fig. 8 Shopkeepers in front of Ta Prohm temple (Luco 2011)

temples and the environment vs. tourism and the socioeconomic development of the local populations still needs to be resolved (Miura 2004). The question of relocating the villagers has been discussed but abandoned.

An authority created by a royal decree, the APSARA, has been entrusted with setting up a comprehensive policy for the management of the site and to coordinate the different stakeholders. Five protection zones were delimited in 1994 along with attendant regulations. The most restricted zones for the local population are Zone One (the monumental site) and the larger Zone Two (protected archaeological reserve) (Ang et al. 1998).

In the field this has translated into the existing villages stagnating in their present condition. It is forbidden for them to build new houses, extend crops, sell land to people from outside the village, cut firewood in the forest, fish, or bring cattle to drink in the ancient ponds. The level of education among the villagers is still very low and the issue of accessing new land for habitat and farming as well as new occupations has been raised for the new generation.

A small number of villagers have been offered an alternative for the new generation, which consists of the creation of a residential and farming area located outside Angkor in Run Ta-Ek (ICC 2007). On this land, so-called 'eco-villages' will be created and tourists will be able to observe the 'typical life of villagers', with the obvious danger that they merely become a part of Angkor folklore.

It is important that future programmes take into account the particularities of this living site where the population has, up until now, preserved their culture from generation to generation whilst continually reformulating it and adapting it to the transformations of the environment and history. By rejecting a space that encourages *fossilization* (in this volume the authors called it "archaeologizing") and excessive "folklorization," a dialogue between the past, present, and future people will be encouraged.

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The Living Archaeology of a Painful Heritage: The First and Second Life of the Khmer Rouge Mass Graves

Anne Yvonne Guillou

Abstract This chapter focuses on a particularly difficult category of 'archaeological artefact,' namely the thousands of human remains of the victims of the Khmer Rouge regime (1975–1979) that were disposed of in mass graves or left scattered across the landscape. After the overthrow of this regime, the handling of these remains fell to the newly installed Vietnamese-sponsored Cambodian state in the 1980s and then the Khmer villagers from the 1980s until now. The chapter describes how the government on the one hand and the peasants on the other have been treating these unidentified bodies in different ways as two contrasting perceptions and practices of memory and commemoration. The peasants' 'living archaeology' of the mass graves is structured by their religious system in which the earth is a major element. The ritual practices performed for the anonymous dead of the mass graves follow two rationales: the rationale of the earth as a living element 'nurtured' by fragments of Angkorean statues as well as by the corpses buried during various times, and the rationale of the sacred geography of 'powerful places.' The chapter draws on ethnographic field work carried out in a village and its environment in the province of Pursat (Western Cambodia).

Keywords Living archaeology • Genocide • Khmer Rouge • Neak Ta • Memory and heritage

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Museums and Memorials: The State Archaeology of Remembering

Democratic Kampuchea was strongly inspired by Mao and his agrarian state doctrine. The Khmer communists dreamt of achieving a 'Super Great Leap Forward' that would catapult Cambodia to a level of political and economic sophistication equivalent to that of the Angkor era (eighth to thirteenth centuries), when Cambodia was a powerful empire. This bloodthirsty utopia led to a totalitarian organization whose chiefs ordered the deportation of hundreds of thousands of people to work as slaves in the rice fields. The revolution led to the death of at least 1,700,000 people who were starved, executed, and died of untreated diseases and other abuses (Fig. 1), as well as to internal purges which created permanent terror among the Khmer Rouge cadres themselves. In 1975, 1,700,000 people represented a quarter of the Cambodian population. One can still read advertisements in newspapers, on posters or on the Internet, written by survivors looking for family members who disappeared some thirty years ago. Today, the uninformed visitor might easily travel through the country enjoying the vision of peaceful villages and rice fields, and remain unaware of the haunted landscape' that is still full of ghosts and painful memories. Democratic Kampuchea was overthrown in January 1979 by its former communist allies from Vietnam, and Cambodia was thrown into chaos. For partly (but not only) strategic reasons the new Cambodian government, set up under the supervision of the Vietnamese, quickly made efforts to build a national justice and memory strategy and to organize public mourning. Pol Pot and Ieng Sary were sentenced to death *in absentia* by the Revolutionary People's Court (Tribunal Populaire Révolutionnaire 1990) and people in the countryside were forbidden to take the law into their own hands by punishing the local Khmer Rouge cadres (but not all of them) who had been cruel during the regime. A museum was set up inside the main political detention camp (S-21) with the help of Eastern European museography specialists (Margolin 2007). The new People's Republic of Kampuchea also dealt with the numerous mass graves, killing fields, and the individual corpses scattered all over the country. Local authorities, following instructions from Phnom Penh, urged the villagers to put the human remains together and place them in bone yards built in each commune (*khum*). Villagers helped by collecting skulls and bones from the locale, although in some places the human remains were simply left in a pile under a big tree, in the bush or in ponds or wells. The sophistication of these bone yards and memorials called *sdop* (from the pali word *stūpa*) or *sang song* (which means 'to build') was more or less dependent on the amount of money available locally, since the country was then suffering under extreme poverty. They were made of wood or bricks and covered by roofs of palm leaves or tiles. According to the Documentation Centre of Cambodia, more than eighty memorials were built in Cambodia in the 1980s (compare Fig. 1). Officials of the party who were appointed members of the newly created Committee of Organization of National Celebrations (*kanakamathikar reap bon cheat*) came to the communes (*khum*) of Pursat and helped to organize the 7 January Liberation Day and the 20 May Day celebrations. The former was the anniversary of the

Fig. 1 Killing sites in Cambodia (Documentation Centre of Cambodia, Phnom Penh)

overthrow of the Khmer Rouge regime while the latter was the so-called Day of Anger (*tivea chang komheung*), which commemorated the victims of Khmer Rouge crimes. Every year an official ceremony was held in front of the memorials, and although Buddhism was barely tolerated in the 1980s, monks from the nearby monasteries were invited to pray for the dead and perform a *bangskol* which, in the present popular perception common in mainland Southeast Asian Theravadan countries, meant that laymen made offerings to the monks who, in turn, are able to send the merits obtained from the dead by chanting special prayers (Bizot 1981). The celebration was also organized for political and propaganda purposes: at that

Fig. 2 Memorial in Takeo. The memorial is pointed to by a man, presumably the village chief, as a proof of genocide (Documentation Centre of Cambodia)

time, the Vietnamese protectorate over Cambodia was criticized inside as well as outside the country and the government made efforts to explain the presence of numerous Vietnamese soldiers and political advisors by insisting on crimes committed by the Pol Pot clique and the danger they still represented if the survivors were not protected by the Vietnamese. The human remains thus became the best proof of the genocide and therefore a symbol of the legitimacy of the newly installed Vietnamese-backed government (Fig. 2). The biggest monument was the Choeung Aek memorial built on a killing field where thousands of prisoners from the S-21 (political) prison in Phnom Penh were sent for execution.

In the early 1990s the time of commemoration was followed by a period of "suspended historicity" (Hughes 2006, compare Hugues 2005) when state memorials were gradually neglected by officials and abandoned in most communes. No one was interested anymore in repairing and looking after these symbols of the genocide. This occurred concomitant with the collapse of the Cambodian Communist State and various state-run facilities (such as ministries, hospitals, and schools) following the rise of political liberalization and the free-market economy. Moreover, these memorials had been set up at a particular time (Cold War, Khmer Rouge guerrilla, isolation of Cambodia, flow of refugees) with ideological and strategic objectives that no longer existed after the peace agreement was signed in 1991 between the four Cambodian parties, and the United Nations Transitional Authority was subsequently established in Cambodia. Furthermore, in the peasants' perceptions these memorials

Fig. 3 (**a**) Ceremony of Paying Tribute to the Spirits (of the dead under the Pol Pot regime), district of Bakan, May 2010. (**b**) Ceremony of Paying Tribute to the Spirits (of the dead under the Pol Pot regime), district of Bakan, May 2010 (Khieuv Chae, 2010)

were state-sponsored commemoration devices to which they did not feel particularly connected. The celebration of the Day of Anger was still performed but it was given a new political colour in the changing ideological context: from a state-sponsored ceremony, it was downgraded to the status of a party-sponsored event and now bears the less aggressive name *korup vineankhan* (Ceremony of Paying Tribute to the Spirits (of the dead under the Pol Pot regime)). It is performed on public premises such as schools in Pursat and other local places (Fig. 3a, b).

Trees, Stones, and Termites Mounds: The Villagers' Living Archaeology of the Mass Graves

The dead at a distance, but still associated with the world of the living.

After the 1991 peace agreement followed by the 1993 free elections, most of the memorials were neglected by the government and collapsed. However, these changes did not affect the life of the villagers. They collectively (and unconsciously) put in place new practices of remembrance framed by the popular religious system based on a 'switch off/switch on' perception of temporality that I will describe below.

In the 1980s, the villagers devoted most of their energy to surviving and building new lives and families. The annual festival of the Gathering of the Rice Balls (*pchhum ben*)—known by foreigners since the French Protectorate as the Festival of the Dead—was permitted again in 1990. It is traditionally a major national festival that facilitates bereavement by enabling people to perform rituals aimed at helping their beloved dead to access a better future life. Although many corpses have been gathered and put in memorials or under large trees, the landscape is still haunted by hundreds of ghosts manifesting themselves through lights and cries in the night. The widespread fear of ghosts/corpses was due to the fact that most of the dead during the Pol Pot regime were seen to have died a 'bad death' and did not receive proper

funerals. As in other Southeast Asian societies, people who commit suicide or are murdered, have fatal accidents, or die during childbirth are perceived as the 'bad dead' (*khmaoch tai hong*, literally meaning 'violent death'), which is in contrast to 'normal death,' which is brought about by old age and ordinary diseases (i.e. associated with natural aetiology). Shorter funeral rituals are usually performed in these cases and there is a risk that these dead do not follow the usual way of *samsāra* but transform into malevolent entities of various forms that stay near the living. The victims of the murderous Pol Pot regime potentially belong to this category. Nonetheless, bushes and forests were progressively cleared, roads were built, and rice fields and fruit trees were planted over the mass graves, a symbolic indication that the life cycle was starting again. A former village chief told me that he created a new market near the Snam Preah memorial in order to prevent ghosts from bothering the living, because ghosts prefer remote, dark, and uninhabited places (there is still no electricity or roads in the countryside and in the 1980s, there were only bicycles). The places associated with violent events (such as slaughters, mass graves, and memorials full of human remains) progressively became 'powerless' (*sap,* which also means 'tasteless'). However, those places were never completely 'inactivated' mainly because the Khmer peasants live in a natural environment that they know is scarred by previous events. Even where there is no longer any mark of these dreadful events in the landscape, the Pol Pot regime is still deeply embedded in it. The peasants remember each pond, well, and field where bodies were found. Sometimes these memories are preserved through the area's toponymy.[1] For example, one rice field is now locally known as the 'Svay Rieng rice field' after hundreds of deportees from the Eastern provinces, including new-born babies and pregnant women, were slaughtered there one night in 1978. Secondly, the building of the state memorials and the official ceremonies that were organized in front of them were not effective enough to pacify the wandering souls. From time to time some of them burst into the lives of the living through dreams to ask that their wishes (for a proper funeral, for instance) be fulfilled. However, in most cases, their wishes are not so different from those of the living or those of the 'normal dead' and include food, offerings, clothes, cigarettes, and even entertainment. In one case a man living near the old Snam Preah memorial (which no longer exists) was asked for help in his dreams:

> One night, five or six years ago (twenty four or twenty five years after the genocide), I dreamt of a man named Sok. He told me that he did not know where to go. He was a dead from the memorial (which at that time was falling apart). So the next morning, with the help of a neighbour, I carried all the human remains from the memorial to another place near the railway behind my house. This was a good place to put the remains because the dead could then go whenever they wanted to go, toward the east or toward the west. They could go back to their native land (*srok*). So we burnt all the remains there. I lit three incense sticks and prayed for the dead, asking them to go back home. And since then, I make offerings of water, rice and food to them every year during the Gathering of the Rice Balls Festival (*phchum ben*) (Fig. 4a, b).

A fifty-year-old woman living near Don Am village has a similar story of being contacted in her dreams:

[1] Compare Luco's contribution in this volume.

Fig. 4 (**a**) Mr. Sophan (in *black shorts*) shows the place, next to the railways, where he was told by the dead Sok to burn the human remains. He chose this site so that the dead could return to their native place. Kropeu Ro old memorial, Bakan district, Pursat, May 2008. (**b**) There are still many human remains in the bush near the railway, like the piece of skull held by Mr. Sophan. May 2008 (Guillou 2008)

> In 1992 (more than ten years after the genocide), I dreamt that a voice coming from the well (in Don Am village, where the bodies were piled up, see Fig. 5a) told me: "Please come and give a video projection! The winning lottery number is 21." The next day, I ran to buy a lottery ticket and won three million riels (around 750 dollars). Then my husband and I built a small house (*khtom*) to say thank you and we invited all the nearby villagers to watch a video. The video projector was installed near the mass grave as requested in the dream. Then, during the next Gathering of the Rice Balls Festival (*phchum ben*), we made offerings to the dead of this mass grave. Later on, I dreamt once again of a voice coming from the well and revealing a winning lottery number to me. But later I never won again. (So she progressively lost interest in the mass grave and neglected to go and worship the place/the dead. Then the *khtom* fell into ruins (Fig. 5b)). But from time to time when I have a dream or fall sick, I always go to the well and offer incense sticks.

In this case, the dead in the mass graves were Khmer Rouge cadres who had been purged and were killed. In the talks between the living and the dead associated with their natural environment, the form of death (which is here 'bad death') is more relevant than the political and social background of the dead in their former lives. This has been also observed about the ghosts of the dead from the Vietnam War (Kwon 2008). The motif of the lottery number revealed by an invisible entity has been reported in other Southeast Asian societies and is not specific to the dead of the mass graves.

The dead merged with their natural environment and 'powerful places'. This popular living archaeology involves the perception that the dead have merged with their natural environment. It takes place in the Khmer popular perception of

Fig. 5 (**a**) The well (*andong*) features in a local woman's dream. In her dream one of the dead asked for a video projection and revealed a winning lottery number. Don Am village, Bakan district, Pursat, May 2008. (**b**) Detail of the small altar (*khtom*), now abandoned, built near the well in order to thank the dead for their help in revealing the winning lottery number, May 2008 (Guillou 2008)

'powerful places' (*konlaeng mean komlang, mean boromey*).[2] 'Powerful places' are sites that can have an influence—in a good or bad way—on the destinies and lives of the living. Some special kinds of trees, stones, objects, and events that took place there reinforce the aura of the place. I found many associations between all those

[2] Editor's note: If we accept Guillou's term of 'powerful places' as a component of the new approach to 'living heritage' in conservation sciences, then the contributions by Warrack and Chermayeff in this volume are particularly useful: how can modern and mostly occidental conservation science acknowledge local social practices on heritage sites (compare the colonial strategies of manuals, photography, and guidebooks in the contributions by Sengupta, Weiler, and Falser)? Furthermore, it seems obvious that mere computer models of the material culture can hardly appreciate and depict these mostly invisible qualities of sites. This is what this volume discusses under the term 'archaeologizing heritage'.

Fig. 6 (**a**) A 'powerful' ficus tree (*daeum chrey*) has grown on a stupa (*chetdey*) that shelters human ashes, 2008. (**b**) The old Buddha's statues from the monastery are kept under the stupa tree. Vat Luong monastery, Snam Preah commune, May 2008 (Guillou 2008)

elements and the dead in general. One of the most outstanding is the connection between trees and the dead. In one case, in Voat Luong monastery (Snam Preah commune), I found a huge and beautiful *ficus* tree *(daeum chrey)* that was said by the old lay ritual officiant (*achar*) to be 'powerful' (Fig. 6a). The branches could not be cut without asking the tree's permission and offering incense to it first. A careless monastery chief even died for breaching this code. The 'power' of the tree is manifested through various signs. For example, the monastery superior now in charge, has found by chance a small silver statue without a head at the bottom of the tree; the old Buddhist statues that are left at the bottom of the tree reinforce its 'power' (Fig. 6b). Moreover, in the 1970s the monastery itself was perceived of as having an 'aura,' which was reinforced by the superior's personal gifts of healing and of predicting the future. This prevented the Khmer Rouge soldiers from destroying the sanctuary. It took me some time to understand that the tree grows on a stūpa that it entirely covers. The *stūpa* is perceived in Southeast Asia as the dead him/herself (Mus 1937). This reinforces the presence of the dead among the living. The power is also closely associated with Buddhism, since the ficus (*daeum chrey*) tree is believed to be the third Buddha Kassapa's tree. This example shows the association between the dead (in the stūpa), a tree, an object (the silver statue which is, like the dead of the mass grave, lying in the ground), and the Buddhist field represented by the Buddhist statues, the monastery, and the *stūpa* itself (which is, primarily, the monument where the Buddha's relics were kept and worshipped).

The 'places manifesting aura' (*konlaeng mean boromey*) are often those where spirits, particularly land guardian spirits (*neak ta*), are merged with the earth.[3] Like the stūpas that I have mentioned above, the land guardian spirits *neak ta* are 'deads present among the living.' Indeed, they are often the first land clearers of the

[3] Compare the contribution by Warrack in this volume about the *neak ta* relevance on a institutionalized cultural heritage site.

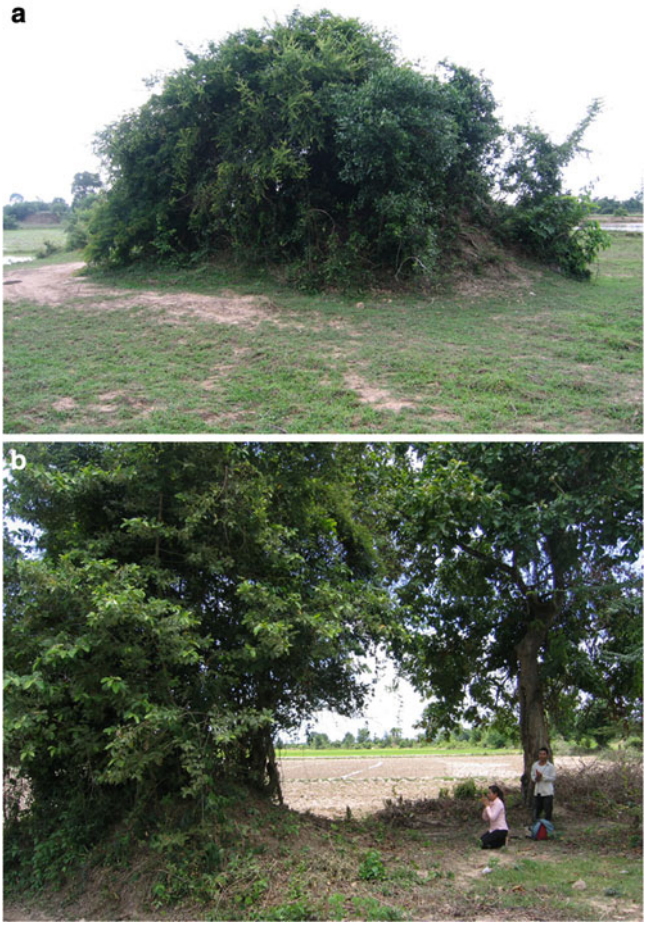

Fig. 7 (**a**) A huge termite mound has grown in this former killing field. It is similar to the termite mound which shelters a land guardian spirit, May 2008. (**b**) The termite mound which shelters a land guardian spirit seen here being worshipped by a woman, May 2008 (Source: Guillou 2008)

villages who are perceived by the villagers as ancestors. Moreover, the *neak ta* are often the dead who cannot be reborn for various reasons, just like the dead of the mass graves. Termite mounds are other signs of 'power' (*boromey*) or of spirits' presence and can be found either near land guardian spirits' places or near some killing sites and mass graves (Fig. 7a, b).

Conclusion

As anthropologist Choulean Ang has demonstrated, the earth is a major element of the Khmer religious system (Ang 1986, 1995). By practicing archaeology in its largest sense—lay and popular as well as professional archaeology—Cambodia is able to plait a string between its past and its present. Beyond the majestic temples of Angkor, there are numerous ruins of temples and ancient buildings from various eras all over the country. The earth is enriched with many fragments of old statues and artefacts, both old and new, in some cases buried during times of war in order to prevent them from destruction and robbery. There are countless stories of people who find valuable objects in the ground and this is taken as a sign of luck or a good omen. The most famous narrative is that of Lady Penh who found Buddha statues near a hill (*phnom*) and founded the Cambodian capital there, the Hill of Lady Penh. These stories and practices related to a popular and sacred archaeology are integrated into a larger system of perceptions about 'powerful places' that are full of *boromey*. In its contemporary sense, *boromey* means a circulating energy that emanates from special places. The anonymous dead of the Khmer Rouge genocide are part of this *Weltanschauung* of places mixing the past and the present and following two rationales, the rationale of the earth, which absorbs and then gives back the artefacts, and the rationale of the sacred geography of the 'powerful places' themselves.

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Authors

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Chief curator in charge of Southeast Asia at the Musée Guimet, Pierre Baptiste directed the renovation of the Southeast Asian galleries of the museum (1996–2001), before curating exhibitions devoted to ancient aspects of Southeast Asian arts (*Art treasury of Vietnam*: *the Statuary of Champa* in 2004 and *Origins of Buddhism in Thailand*: *the art of Dvaravati* in 2008). He published the *Catalogue of the Khmer Collection of Musée Guimet* with Thierry Zéphir and is now preparing an exhibition on Louis Delaporte and the rediscovery of Khmer temples in late nineteenth century to be opened in October 2013.

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Jane Clark Chermayeff is an educator and planner known for her uncommon approach to site interpretation and designs of creative learning environments. She founded Jane Clark Chermayeff & Associates (JCC&A) in 1982 after holding

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positions at the Smithsonian Institution's Traveling Exhibitions Service, the National Endowment for the Arts, and the Smithsonian Cooper-Hewitt Design Museum. JCC&A heritage interpretation clients include the National Park Service, the National Museum of American History, the World Monuments Fund, and the Discovery Channel. In 2010, Jane began a five-year term as a Fulbright Specialist in Museology.

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Olivier Cunin

Olivier Cunin is an architect who, since 1999, has been researching in situ the Bayon style monuments and other Khmer monuments by applying the methods of building archaeology and the scientific techniques of archaeometry. The research project *From Ta Prohm to Bayon*, still in progress, was initiated in 2000 for his PhD thesis in architecture at the National Institute of Polytechnic of Lorraine (INPL). The topic of this doctorate thesis, obtained in 2004, was a comparative analysis of the architectural history of the Bayon-style monuments. The results were completed from 2005 to 2007, at the Center for Khmer Studies (CKS), with a specific study of the wooden structures of this Buddhist complex now missing. In 2008, Cunin was a consultant for the Swiss team in Banteay Srei (BSCP) who elaborated and designed the didactic panels of the permanent exhibition of the interpretation center of this monument. Since 2009, he has been engaged with the virtual reconstruction of several Bayon-style monuments in preparation of the publication of the results of his research project "From Ta Prohm to Bayon."

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Michael Falser (MA, MSc, PhD) studied architecture at the Vienna University of Technology and at the École d'Architecture Paris La Villette, and art history at the University of Vienna. He wrote his dissertation on the political history of historic preservation in Germany as DFG-fellow in the graduate programme "Building Research—Art History—Historic Preservation" at the Berlin University of Technology. After practical experience as a preservation architect in San Francisco and the Austrian UNESCO-Commission in Vienna, he worked as scientific assistant at the Institute of Building Research and Conservation at the Swiss Federal Institute of Technology in Zurich and at the art history department at the Ludwig-Maximilians-Universität in Munich. Since 2009, he has been a research fellow at the Cluster of Excellence "Asia and Europe in a Global Context" at Heidelberg University. His research focuses on the discussion of heritage as a transcultural concept using Angkor Wat in Cambodia as his case study. He conceptualized and organized the workshop of these proceedings that took place in May 2010 in Heidelberg, Germany. He is member of ICOMOS Austria and ICOMOS' International Scientific Committee of the Theory and Philosophy of Conservation and Restoration.

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in the vast steppes of Central Asia along the ancient Silk Road (Kyrgyzstan/Kazakhstan). In the area of heritage documentation Aachen University was among the first to introduce digital documentation and visualization techniques to archaeological sites in the field (i.e. Mohenjo-Daro/Pakistan 1978–1985).

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Fabienne Luco is an independent researcher in social anthropology (PhD candidate, E.H.E.S.S. Paris). Resident in Cambodia since 1993, she has conducted research on practices of space and time amongst the populations living in Angkor, on the fishing villages in Tonlé Sap, and the management of local conflicts. She has also worked as an expert for the United Nations in the field of human rights (UNHCR) and culture (UNESCO). Recently, she also worked for the Phnom Penh-based Extraordinary Chambers in the Courts of Cambodia (ECCC) in the context of the Khmer Rouge trials.

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Pierre Pichard

Pierre Pichard, a French architect and a honorary member of École Française d'Extrême-Orient, started working in Thailand in 1966 when assisting M. C. Yachai Chittrabongse in the restoration of Prasat Hin Phimai and Prasat Hin Phanom Rung under the guidance of Bernard-Philippe Groslier. Since that time, he has been involved in architectural research and conservation projects in Burma, India, Bangladesh, Vietnam, Bhutan, Thailand, Cambodia, and Laos. He was international coordinator of UNESCO projects at Pagan from 1982 to 1992 and published eight volumes of the *Inventory of Monuments at Pagan* (1992–2001). His other

publications include studies of the Khmer temple of Phimai and of Wat Si Chum in Thailand, and of the Chola temples at Tanjavur and Gangaikondacholapuram in India. He is co-editor of *Etudes birmanes* with F. Robinne (EFEO, 1998), and of *The Buddhist Monastery* with F. Lagirarde (EFEO, 2003). He lives at present in Bangkok.

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John Sanday

John Sanday is a British architect who received his degree at Bristol University. Following an apprenticeship, which lasted several years during and after obtaining his degree, Sanday began his professional career in Asia in 1970 with his first visit to Nepal as a UNESCO consultant. Following missions to Bangladesh, Malaysia, and Pakistan, Sanday was invited to join the Getty Foundation in California to set up their architectural Conservation Grant Program, which took him to many different nations to seek out suitable applicants for financial assistance to support the development of conservation technology and the training of local professionals and craftsmen. Having led the World Monuments Fund program in Angkor working in Preah Khan, Ta Som, Phnom Bakheng, and Angkor Wat, Sanday joined the Global Heritage Fund as their regional director for Asia and has been responsible from its inception for the Banteay Chhmar Project. Sanday is still based in Nepal where he is the chairman of John Sanday Associates, an architectural practice working on a variety of new and historic projects and undertaking seismic assessments of both old and new structures.

Selected Publications

- 1982. *The Palace of Leh in Ladakh—An Example of Himalayan Architecture in Need of Conservation*. London: Monumentum.
- 1988. Author of the Section on Bangladesh in *Insight Guide—Southeast Asia*. Singapore: APA Productions.

- 1989. *The Kathmandu Valley—A Jewel of the Kingdom of Nepal*. London: Collins.
- 1997. "The Triumphs and Perils of Khmer Architecture: A Structural Analysis of the Monuments of Angkor." In *Sculpture of Angkor and Ancient Cambodia Millenium of Glory*, edited by Helen Ibbitson Jessup and Thierry Zephir, 81–93. London: Thames and Hudson.
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Indra Sengupta

Indra Sengupta is Academic Coordinator of the Transnational Research Group 'Poverty Reduction and Policy for the Poor between the State and Private Actors: Education Policy in India since the Nineteenth Century' at the German Historical Institute London. In 2011–2012, she was a visiting fellow at the Cluster of Excellence 'Asia and Europe in a Global Context' at Heidelberg University. Her research interests include the history of knowledge, especially knowledge in colonial India and Europe, German Orientalism, and monument-making practices in colonial India. Her current research is on monument making in late colonial India, incorporating local, colonial, and metropolitan perspectives. From 2004 to 2011, she was a research fellow in British Empire and Commonwealth history at the German Historical Institute London. She has also held the position of temporary professor of Indian history at the Centre for Modern Indian Studies at the University of Göttingen.

Selected Publications

- 2005. *From Salon to Discipline: State, University and Indology in Germany, 1821–1914*. Würzburg: Ergon.
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Georgios Toubekis

Dipl.-Ing. Georgios Toubekis is a doctoral researcher at RWTH Aachen University. He received a diploma of architecture from RWTH Aachen University and is a

member of ICOMOS Germany. He has been project coordinator for the project of RWTHacdc in Afghanistan and conducted various field trips in Pakistan and Afghanistan for the documentation of UNESCO World Heritage sites. In Bamiyan he was the on-site engineer supervising the safeguarding efforts for the fragments of the destroyed Buddha figures. His current research topics are methods for the sustainable implementation of preservation and management standards on cultural sites, especially World Heritage Sites in developing countries. In his collaboration with the Aachen Excellence Cluster UMIC (Ultra High Speed Information and Communication) a special focus is on the use of contemporary technologies from the field of applied information science in order to foster community involvement in cultural heritage projects.

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- With Jansen, Michael, and Andreas Walther. 2008. "Laser Scan Measurement of the Niche and Virtual 3D Representation of the Small Buddha in Bamiyan." In *Layers of Perception: Proceedings of the 35th International Conference on Computer Applications and Quantitative Methods in Archaeology (CAA), April 2–6, 2007, Berlin, Germany*, edited by Axel Posluschny, Karl Lambers, and Irmela Herzog, 83–90. Bonn: Habelt.
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Simon Warrack

Simon Warrack is a British-born stone conservation consultant based in Italy. He received a degree in Renaissance history from the University of Warwick and then, having decided to work in the field of conservation, he attended the Building Crafts Training School in London. Following a four-year apprenticeship at Canterbury Cathedral he moved to Venice where he attended the San Servolo Course (UNESCO) and the ICCROM/UNESCO Stone Conservation Course. After many projects in Venice and Rome, he became involved in the conservation of the Temples at Angkor in Cambodia in 1994. Since 1994 his work has centred on

stone conservation and training in Southeast Asia though he has also worked in Ethiopia with ICCROM on the preparation of the Technical Feasibility Study regarding the return of the Obelisk of Axum and on the implementation of a training programme for young national conservators in Cambodia. In 1998 he prepared a Training Needs Assessment for Southeast Asia ICCROM and the World Heritage Centre. He was coordinator of the 17th ICCROM Stone Conservation Course in collaboration with the Getty Conservation Institute and is also preparing training programmes for various sites in the Kingdom of Cambodia on behalf of ICCROM and the Royal Government of Cambodia.

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Katharina Weiler

Katharina Weiler is an art historian who studied at the universities of Heidelberg, Germany and Bern, Switzerland. She focuses on the encounters between European and Asian concepts in art and architecture and explores issues of cultural values in different settings. For her PhD dissertation titled *The Neoclassical Residences of the Newars in Nepal*, she conducted extensive research on Nepal's recent architectural history. As a postdoctoral research fellow, she supervised 'Aspects of Authenticity in Architectural Heritage Conservation' (2009–2012), a research project under the aegis of the Cluster of Excellence 'Asia and Europe in a Global Context: Shifting

Asymmetries in Cultural Flows' at Heidelberg University. She identified the negotiation processes between local and international concepts of maintenance and conservation of architectural heritage in China, Germany, Japan, India, and Nepal, and she documented present practices at actual and recent sites. She currently is curatorial assistant at Staatliche Kunsthalle Karlsruhe.

Selected Publications

- 2009. "Das antike Athen—Eine Entdeckungsreise und ihre Inszenierung in englischen Reiseberichten und Architekturlehrbüchern des 17. und 18. Jahrhunderts." In *Von Harmonie und Maß—Antike Monumente in den Architekturlehrbüchern des 16. bis 19. Jahrhunderts*, edited by Elke Seibert, 62–69. Heidelberg: Mattes Verlag.
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- "Fine Feathers Make Fine Birds. Portraiture and Costumes of Rana Rulers and Their Relatives." In *Early Photography in Nepal*, edited by Susanne von der Heide (forthcoming).
- 2013. "Lebendige Handwerkstraditionen—ein transkultureller Mythos am Beispiel Indiens." In Kulturerbe—Denkmalpflege: Transkulturell, edited by Michael Falser and Monica Juneja, 243–262. Bielefeld: Transcript.
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