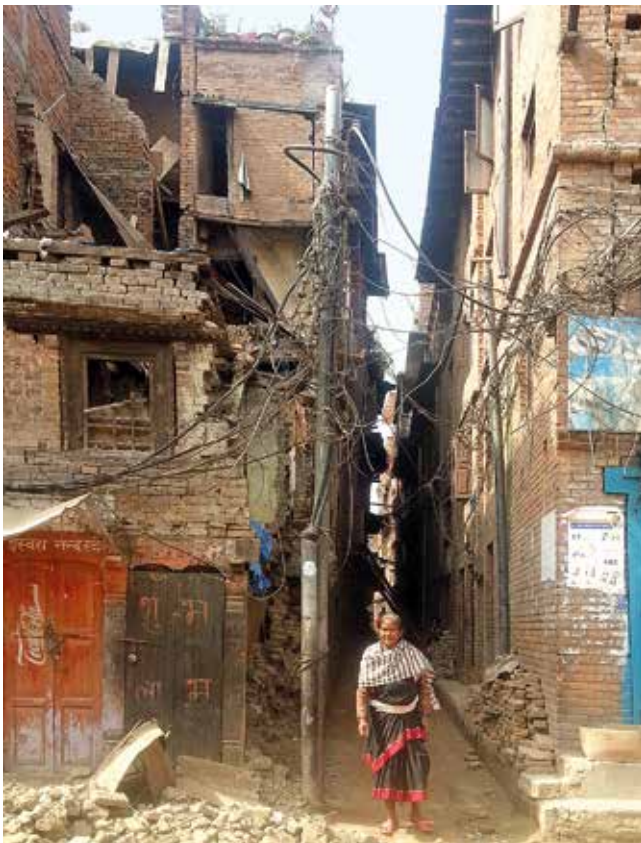


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Cultural Continuity in Post Gorkha Earthquake Rehabilitation

Introduction

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



A woman in traditional attire standing in front of an area of historic Bhaktapur which was badly damaged



The Swayambhu hillock with the Mahachaitya used to be an island but now overlooks a sea of houses



Naga-vasa-hrada, the lake of Nepal Mandala or Kathmandu Valley, with the Swayambhu Mahachaitya on an inland in the form of a lotus flower as depicted on the now destroyed mural in the Shantipur Temple

One kept hearing of the great Nepal Bihar Earthquake of 1934 and regularly experienced smaller tremors. This raised concern that the next great earthquake would have a devastating effect on the Kathmandu Valley which over the decades had developed with uncontrolled urbanisation. During the past years the Kathmandu Valley World Heritage Site had been preparing for the earthquake that was to strike Nepal (Government of Nepal 2007). The rough assessment by the geologists that there was a slip deficit along the section of the Himalayan arc in western Nepal and an earthquake was eminent came to be true. On Saturday, 25 April 2015 a 7.8-magnitude earthquake struck Nepal, with the epicentre about 40 km northwest of Kathmandu. Even though there were several hundred aftershocks, with one of 7.3-magnitude on 12 May 2015, geologists have been warning that not sufficient energy has been released.



Collapsed structures of the Hanuman Dhoka Palace Museum, Kathmandu



Community and armed forces helping to salvage from a collapsed temple in Patan



A collapsed building in the historic city of Kathmandu

The rehabilitation of the cultural heritage will be a test for the motivation and resilience of the cultural communities. Considering the fact that the last major earthquake was over 80 years ago, there has been a generational information gap. The lessons that would have been learnt from previous experiences seem to have been forgotten. The great difference in the response to this earthquake has been the introduction of engineered structures that have replaced the centuries of traditional knowledge. One of the greatest challenges in restoration of monuments has been the absolute lack of understanding of and confidence in the structural performance of traditional structural systems.

The Moving Mountains – the natural and supernatural context

The geological process that created the Himalayan range is defined by the collision of the Indo-Australian Plate with the Eurasian Plate some 40 million years ago. The final thrust which might have taken place as late as 600,000 years ago squeezed up great masses of rock to create massifs with peaks over 8000 m high.

The mountains formed a climatic barrier with the northern areas drying up and the mighty Indus and Brahmaputra Rivers encircling the mountain range. The southern slopes were pounded by the humid Monsoon winds. The tectonic collision continued with the great mass of rocks being further piled up until the weight was so great that it sheared from the surrounding landmass. This blocked the rivers and created lakes along the whole range. Rivers collected and flowed along this east-west fault line, breaking through at a few specific points to flow down into the Gangetic plains (Hagen 1960).

This violent and seemingly chaotic tectonic collision created a landscape that reflected the cosmic order, the abode of the gods. In the foothills of the mighty Himalayas, the lake of Nepal Mandala or Kathmandu Valley was created, which was Naga-vasa-hrada, the kingdom of the serpent king or Nagaraja. It was flanked on either side by seven holy rivers of the Kosi watershed to the east and the Gandaki watershed to the west (Weise 1992). The earthquake that allowed for the waters of the lake to drain out along the Bagmati River possibly for the last time some eighteen thousand years ago is interpreted as Manjushree cutting through the hill with her mighty sword. This shows how closely the peo-



The Swayambhu Mahachaitya showing the temporarily sealed cracks after removal of layers of lime-wash



The damaged entrance to Shantipur, the tantric temple, which can only be entered by an initiated priest

ple understood their environment and geological processes were attributed to the creative energy of the gods (Smith 1978).

The landscape within the Kathmandu Valley was created through water cutting into the sediments that gradually deposited fluvio-lacustrine clay and sand at the bottom of the lake. The black clay contained decayed organic matter from the lake which made it extremely fertile and allowed for a highly evolved civilisation to develop (Smith 1978). The initial timber construction that was vulnerable to fires slowly changed to a combination of

timber and burnt brick. This however required the adaptation of the brick architecture to recurring earthquakes, especially since the particular soil caused greater amplification and possible liquefaction.

Preparing for the Great Earthquake

In anticipation of the next big earthquake preparations were undertaken. Several key government officials went to training courses on disaster risk management. Regular community meetings were held. International training courses on disaster risk management for urban heritage were carried out in Kathmandu. In November 2013, a week-long symposium “Revisiting Kathmandu” was organised by ICOMOS Nepal, the ICOMOS Scientific Committee for Risk Preparedness, UNESCO and the Department of Archaeology with support from the local site managers (Weisse 2015). The 80th anniversary of the 1934 Great Nepal Bihar Earthquake started the countdown to the next big earthquake. The international symposium was in preparation to the countdown, linking the discussions between authenticity, management and community with disaster risk reduction.

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

The earthquake did strike – immediate response

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

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

The first coordination meeting took place at the UNESCO Kathmandu Office just five days after the earthquake, together with the various authorities and stakeholders, as well as organisations involved in the cultural heritage sector. The following week the Earthquake Response Coordination Office (ERCO) was established at the DOA. To ensure that all stakeholders for the preservation of historical monuments were working together with a shared approach, the first two months were declared a response phase. This meant that everything possible needed to be done to prepare the heritage sites for the onslaught of the Monsoon. The main construction materials such as wood, brick, roofing tiles and stone along with the artefacts and ornaments which were lying in a pile of rubble needed to be salvaged and stored. Damaged struc-

tures needed shoring and protection from the rain. It was decided that a proactive approach would be applied to the World Heritage properties, the sites on the Tentative List and the monuments on the classified list of the Department of Archaeology. The remaining monuments would need to be left to the communities and local authorities for them to restore, however providing them with support and expertise where required.

Damage assessments

The historic settlements in the Kathmandu Valley

The historic settlements within the Kathmandu Valley would have found their origins in the Licchavi period in the first millennium, but the visible remains are from the Malla period. Though the buildings would have been rebuilt over the centuries and might not be much earlier than the 17th or 18th century, some of the reused wooden elements could date back to several centuries earlier (Gutschow 1982). These compact Newari settlements were built on higher ground, where possible on stable ridges protruding above the fertile sediment deposits. The agricultural land was prioritised and categorised as per type, number of crops and overall yield, with the highest ranking given to the wet paddy crop. The settlements were strategically located, built in compact form with clear hierarchies in public spaces and monumental buildings (Nepali 1965).

The traditional settlements within the Kathmandu Valley are being lost to development. The earthquake has further decimated the settlements that have managed to retain at least a semblance of the historic character. The settlements within the World Heritage monument zones that were severely damaged were a large part of the historic city of Bhaktapur as well as the village of Changu Narayan. The historic settlements on the World Heritage Tentative List severely damaged were Sankhu and Khokana along with nearby Bungamati. These are among the 52 settlements identified within and closely linked to the Kathmandu Valley.

Preliminary steps have been taken for the rehabilitation of the historic town of Sankhu where up to 90 percent of the traditional buildings were affected by the earthquake. Despite the magnitude of the disaster, the local community immediately got involved in salvaging the important wooden elements of the damaged buildings, ensuring that they were safeguarded. The initial response shows that the community does want to rebuild the settlement in its traditional form. This however will require critical decisions to be taken in respect to rebuilding the entire settlement, the public spaces and the buildings in their original structure and form, while ensuring the reuse of the salvaged elements. This can only take place with the commitment of the community, financial and technical support as well as a functioning local governance system.

The Swayambhu ensemble – the seat of Vajrayana Buddhism

The Swayambhu Mahachaitya that stands on the top of a hillock to the west of Kathmandu is the centre of Vajrayana Buddhism. This is where legends say the lotus with a thousand petals, manifesting Swayambhu, the self created, sprang from the murky waters of the Naga-vasa-hrada. The dome supports a square harmika which is crowned by 13 rings and a parasol, symbolising Buddha as the universal monarch. The earthquake impacted the Mahachaitya, with over 250 metres of cracks on the dome and the top three



Collapsed Kastamandap, the oldest monument which gave Kathmandu its name (meaning wooden structure), regrettably being cleared using excavators



Collapsed Chasin Dega at Hanuman Dhoka behind a stone plaque indicating World Heritage status

rings being displaced. The cracks have been temporarily sealed off with acrylic paste and covered with elastic polymer membrane ensuring that water does not penetrate the structure during the monsoon and that monkeys don't remove the sealant. After the rains the structure will require detailed structural and material investigation to come up with a long-term solution for stabilisation.

Practically all the monuments, both monasteries and the 17 houses owned by the priests on top of the hillock, were damaged. An entire reconstruction plan is required for the historic ensemble that will allow for possible rectification of earlier encroachments. Of the twin tantric Shikhara temples, Pratappur recently rebuilt after a fire in 2003 and a lightning strike in 2011 has survived with some damage around the plinth. Anantapur however collapsed. The nearby Tashi Golma shrine also collapsed, revealing that it was filled with ceramic, stone and metal votive artefacts



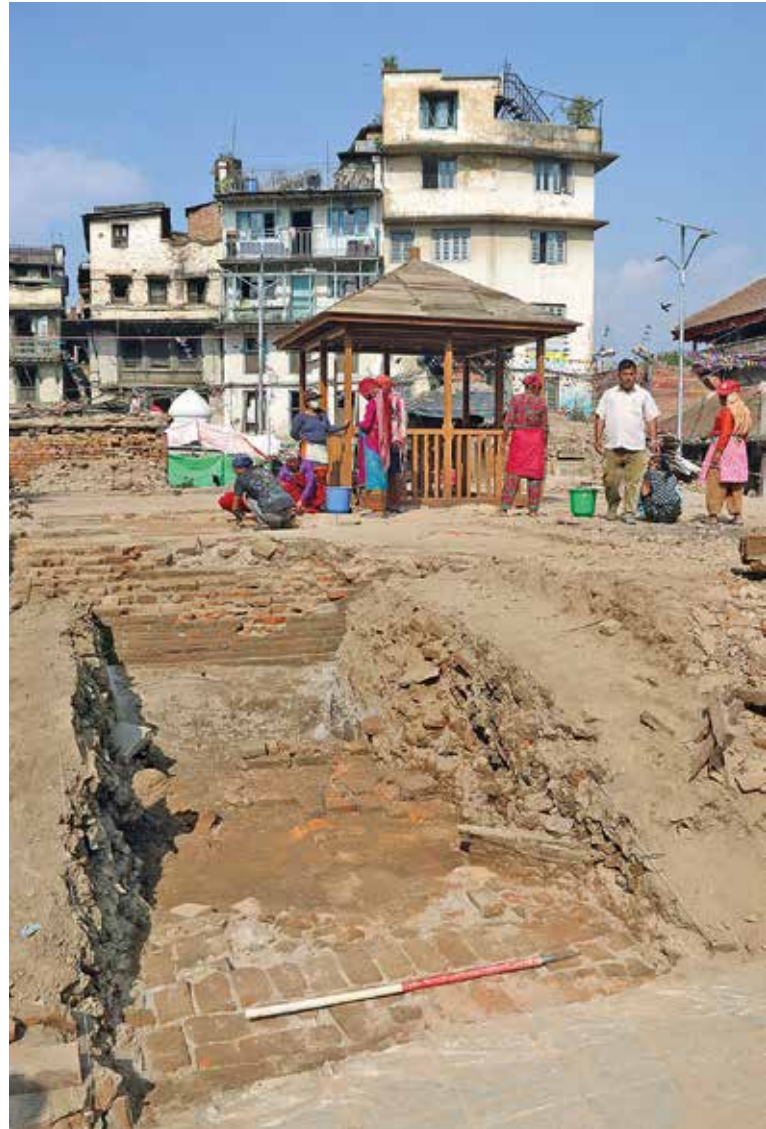
Shoring to protect the façade from collapsing onto the main Hanuman Statue with the intact Agamchhen Temple that is raised on timber stilts over the palace

that over centuries seem to have been collected and reused during previous reconstructions.

The tantric shrine of Shantipur where only initiated priests are allowed to enter was also damaged. Of the series of three chambers, only the first chamber adorned with wall paintings was open to visitors. The internal walls collapsed, the entrance wall was deformed and large parts of the wall paints were dislodged. The complexity of restoring this monument is linked to salvaging the wall paintings and ensuring that the sanctity of the inner chambers is maintained. This requires a carefully orchestrated process of screening off the inner sanctums, salvaging and propping the structure with the participation of the priests, the local community, the authorities as well as experts in various fields.

Kastamandap – the wooden pavilion

The damage on the monuments around Hanuman Dhoka Durbar Square was extensive. Kastamandap, the oldest monument which gave Kathmandu its name (meaning wooden pavilion) was



Archaeological investigations of the foundations of Kastamandap led by a team from Durham University found the foundations to be in perfect condition

tragically hosting a blood-donation campaign when it collapsed. The collapse of Kastamandap raises questions concerning earlier interventions rather than design faults. In the rush to reconstruct monuments, simplified procedures were used. It is important to understand that the restoration project of Kastamandap in the 1970s covered up the fact that one of the main four central posts was not resting on a saddle stone. At the base of many of the posts the tendons were missing and the holes in the saddle stone filled. The structure probably collapsed because it was not locked to the plinth and was standing on only three out of four main posts. We also know that the structure did not collapse immediately and many would have survived if they had fled. Further research and documentation is required to fully understand what happened.

Rehabilitation of traditional settlements

Such extensive devastation of the low-rise vernacular village houses was not expected. The discussions about shelter quickly flared up with wild contributions flooding in from all over the

world. Highly decorated architects joined the throngs in coming up with the “ideal design”. There was a drive to get “pre-fab” buildings on the market. There were contributions of designs tested under the harshest conditions of Caribbean hurricanes. There were designs presented by foreign development agencies of seismic designs developed in Indonesia. A more practical design that even well-meaning urbanites could help set-up was the vaulted shelter of corrugated iron sheeting. In the meantime, the villagers had actually salvaged materials that were available and constructed shelters, catering to their own needs.

The danger was that these blunders of the response period could deter more sustainable reconstruction efforts while introducing materials that could pollute the environment. There are no perfect solutions to rebuilding the villages. At present, the most prioritised criteria are obviously the need for the shelters to be earthquake-resistant. However, the only way of ensuring a certain level of seismic stability over a longer period is by providing a continuous process of renewal. This will be the key consideration to establishing sustainable reconstruction. The government will need to deliberate over these issues and come up with a binding policy on reconstruction for all involved authorities and agencies.

The general trend for construction that is believed to be “strong” is reinforced cement concrete frame structures. The structural system is based on the casting of cement concrete and steel reinforcement into a monolithic structure. This system functions admirably well as long as the members are properly dimensioned and the material is intact. However, should the design be insufficient or the materials be deteriorated over time, it is not possible to renew this system without total demolition and reconstruction. In the context of remote villages with limited resources this periodic total reconstruction will not take place and death-traps are created. A structure built to be strong today will become a death-trap in a future earthquake.

The process of renewal ensures maintenance and the continued replacement of damaged elements. This requires the construction system to be such that replacement of elements is possible, which also links to the principles of reversibility. Should there be a lack of timber to reconstruct the vast numbers of villages, the main structural elements might be replaced by steel or even reinforced concrete elements. If these industrially manufactured elements are designed to be used respecting traditional construction systems, the villagers will be able to replace them if and when necessary.

The traditional settlements are the products of diverse cultural expressions. All the components of the village, the shrines and open spaces, the individual houses, the terrain, the materials and the workmanship become important for the specific identity of the particular village. These cultural aspects are tangible, but linked together by the intangible significance given by the inhabitants to the environment within which they live.

Strategic planning – pacing reconstruction

The earthquake response in respect to cultural heritage has been strategically segregated into phases. The first phase of two months was exclusively reserved for earthquake response which involved preparing the affected cultural heritage for the oncoming rains. This was followed by the monsoon season when the rains do not allow for much construction work to be carried out. The efforts of the response phase are being monitored especially in respect to the effects of the rains on damaged monuments. This



Sorting of salvaged wooden elements from Hanuman Dhoka Durbar Square



Still lots of work to be done, taking a rest at Hanuman Dhoka



Indra Jatra being celebrated before the earthquake; despite the destruction this has continued, which ensures cultural continuity



People lining up to pray at the Char Narayan Temple in Patan Durbar Square before its collapse

next phase focussing on planning and research comprises five approaches (Weise 2016).

1. Legal Approach: There was an immediate need for the preparation of policies and guidelines. The Post Earthquake Rehabilitation Policy for Cultural Heritage was formulated by a team from the Earthquake Response Coordination Office (ERCO) and was submitted to the ministry for adoption. The Conservation Guidelines for Post 2015 Earthquake Rehabilitation (Conservation Guidelines 2072) have been formulated and adopted. The guidelines also look at sites, monuments and historic buildings over time and introduce provisions for maintenance and renewal. A post-disaster rehabilitation Procedures Document has been submitted for further discussions and adoption.
2. Research Approach: Extensive research is required to better understand the complexity of the sites in historical as well as technical terms. Detailed structural and material research of the damage on monuments such as the Swayambhu Mahachaitya and Hanuman Dhoka Palace will help to retain most of the original structure. Urban archaeology at Durham University has investigated the foundation of collapsed temples and cross-sections of the Durbar Squares to better understand the chronology of these sites. Geological research is required to study stability of slopes and soil conditions. Furthermore, the safeguarding and sorting of salvaged artefacts is being carried out in systematic manner with detailed inventories. Along with this, the conservation of mural painting has been going on.
3. Planning Approach: Several complex cultural heritage sites and historic settlements will require specific Rehabilitation Master Plans. These will be prepared for Hanuman Dhoka, Swayambhu, Changu Narayan as well as Sankhu, Nuwakot and Gorkha. The Rehabilitation Master Plan will help clarify the multitude of involved donors, managers, supervisors and the communities. It will also define how and over what time period the reconstruction will realistically be carried out. This will require procedures for supporting the restoration of settlements and traditional dwellings.
4. Practical Approach: The rehabilitation and reconstruction of the monuments will only be possible if we have knowledgeable

and skilled artisans. The master crafts-persons must be identified and acknowledged. They must be seen as “living national treasures”, as the Japanese do for “keepers of important intangible cultural properties”. The system of apprenticeship must immediately be expanded to ensure that sufficient artisans are trained to allow for the restoration of the tangible heritage. This would have to be coordinated with the procurement of appropriate materials. The government must also change the system of tendering and giving such delicate work to the lowest bidder. A system of prequalification, inclusion of artisans and quality control must be introduced.

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

Considerations for rehabilitation and cultural continuity

The rehabilitation of the communities and the cultural heritage will take many years. An initial six-year-plan is being prepared so that certain targets are met by July 2021. Though there will be a formal system of carrying out the rehabilitation of many of the heritage sites, it will be the informal interventions by the community that will be most critical. The response in most areas has been controlled and communities have been obstinate not to give in to the dire circumstances. It is this spirit of the communities, often in the form of the traditional Guthi system, that will be vital to ensure that recovery will take place rapidly (Sharma and Shrestha 2007).

The clash between modern engineering interpretations and traditional non-engineered knowledge seems to have come to a head. Reconstruction is being proposed using modern engineering parameters without even properly assessing the performance of the traditional structure or understanding the reason for the damage or collapse. Why did the central timber mast of the Bauddhanath Stupa get damaged? Was it because the base of the harmika had been cast using cement concrete? Was the brick masonry in mud mortar in the plinth of Pratappur Temple shattered by the recent reconstruction of the superstructure in the more rigid lime-surkhi mortar? Did the upper part of the nine-storey palace at Hanuman Dhoka collapse because of the fracturing of a reinforced cement concrete tie-beam introduced during the 1970s restoration? There were several tiered temples that collapsed that had concrete tie beams. What was the cause of the collapse? Even the collapse of Kastamandap raises questions concerning earlier interventions rather than design faults.

The lack of understanding of the traditional structures is alarming. In the rush to reconstruct certain monuments, simplified procedures are used. It is important to understand that the restoration project of Kastamandap in the 1970s covered up the fact that one of the main four central posts was not resting on a saddle stone. At the base of many of the posts the tendons were missing and the holes in the saddle stone were filled. The structure probably collapsed because it was not locked to the plinth and was standing on only three out of four main posts. We also know that the struc-

ture did not collapse immediately and many people would have survived if they had fled.

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

The measure of success of the rehabilitation process will depend on the continued performance of rituals, festivals and celebrations. The clearing of certain spaces was determined by the need to carry out certain ceremonies. For example, the entrance chamber of Shantipur needed to be cleared for the priests to perform certain tantric rituals on 11 June, pressurising those working on the salvaging of the fallen pieces of mural painting. The Hanuman Dhoka palace area needs to be cleared to ensure that the chariots for the Indra Jatra festivals can be drawn through the ceremonial route. This is also when the huge face of Seto Bhairab is shown to the masses and local alcohol flows from the mouth as Prasad. The surrounding structures are, however, in a precarious state and need to be stabilised. For the Rato Machhendranath chariot this was the auspicious twelfth year when it

is drawn from Bungamati to Patan. However, it got stuck when crossing a stream and is in a precarious state, since if the ceremony is not carried out, the responsibility will be transferred from Patan to Bhaktapur. These festivals must be continued and are crucial for cultural continuity. For example, the Char Narayan Temple on Patan Durbar Square totally collapsed, but the main deity was reinstated and covered with a temporary shelter allowing the community to pray.

With the earthquake and the extensive damage it caused, a whole series of questions have arisen in respect to cultural continuity and the use of modern technology. Before beginning with the reconstruction of traditional settlements and historical monuments, there must be a clear consensus on the approach and the reason for these endeavours. In respect to authenticity, these reconstructed structures must ensure a credible expression of their original value that will ensure cultural continuity. At the same time there must be further research done on the traditional materials, technologies, structural systems and form to devise an improved means of reconstruction deeply rooted in the local traditions. The extensive task of reconstruction will need to be coordinated to ensure that there is no duplication or misappropriation that will question the very core of the integrity of those involved. In any case, the growing understanding of cultural heritage being inclusive will require the community to be involved. It will be through the motivation and skills of the community that cultural continuity will truly be ensured.

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Credits

All photos taken by Kai Weise.