

# Post-Earthquake Urban Reconstruction in Nepal



Community space at Bungamati

The devastating earthquake of 25 April, 2015 has shown that building safe houses is not enough and there is a need for enough open spaces.

The devastating earthquake of 25 April, 2015 destroyed World Heritage sites in Kathmandu, Bhaktapur and Lalitpur, including the iconic Dharahara and historic Kasthamandap Temple. It flattened traditional Newari settlements in Bungamati, Sankhu and Khokana and partially damaged others. Many neighborhoods of Kathmandu, Lalitpur and Bhaktapur were severely affected, forcing people to take shelter in open spaces and streets. Many villages were abandoned and the villagers were relocated to nearby spaces. Some of the villagers from Rasuwa, Nuwakot and Sindhupalchowk shifted to Kathmandu and stayed in temporary camps for several months.

The earthquake and hundreds of aftershocks created panic among the people living in densely populated areas of Kathmandu Valley. It was then that they felt the dire need for public spaces—for emergency shelters. They also realized how vulnerable they were to such acts of nature even if they were living in strong buildings. Fortunately, there was less damage to hospitals, government buildings (except the historic Singha Durbar) and supermarkets. Similarly, basic services like electricity, water supply and telephone

remained uninterrupted. The early recovery process started quicker than anticipated and life mostly resumed normally after a week.

Nepal Engineers' Association mobilized more than 3,000 engineers to conduct Rapid Visual Assessment of private houses, while Department of Urban Development and Building Construction conducted a similar exercise for government and public buildings. Engineers, architects, geologists and environmentalists from many countries gathered in Nepal to observe and analyze the causes, effects and extent of the damage. Series of workshops, seminars and interactions were held by government agencies, universities and communities on the subject. The nature of damage and its probable causes were discussed and temporary shelter and rehabilitation plans were formulated.

The government ordered its agencies to review the building code and propose safer building designs to suit different climatic conditions. Information on fully and partially damaged buildings was collected through Central Bureau of Statistics (CBS). Exhibitions of innovative designs of temporary shelters were conducted to motivate people to construct temporary shelters that could last up to two years.

National Reconstruction Authority (NRA) was established to manage and coordinate the reconstruction work. NRA is also responsible for coordinating and collaborating between government, non-government and donor agencies for rehabilitation and reconstruction activities. NRA developed and approved designs of safer houses and formulated policies for resettlement of villages in vulnerable locations.

The government also formulated building construction and settlement development guidelines for reconstruction of earthquake affected areas. This guideline was meant to be implemented by municipalities and Village Development Committees (VDCs). Trainings were conducted for engineers/architects, masons and craftsmen to orient them to the guideline.

The process of verification of earthquake victims in Kathmandu Valley started a year after it was completed in 11 districts outside Kathmandu Valley.

The awareness created by the practice of observing Earthquake Safety Day, since before the earthquake, had led to lower than expected level of casualty despite the devastation Kathmandu Valley suffered. The valley lost most in cultural heritage, traditional settlements and government buildings.

As per the Post Disaster Needs Assessment (PDNA) document, published by the National Planning Commission, the earthquake completely destroyed 446 health facilities including five hospitals. Similarly, 19,000 classrooms of 7,923 schools were completely destroyed and 11,000 damaged. Altogether 2,656 government buildings were destroyed and 3,622 damaged.

When reconstruction began, the delays in taking up the heritage sites became conspicuous. However, there were multiple reasons for that—such as uncertainties of funds committed by donors, overlapping roles and responsibility of government agencies and grievances of local communities.

## **Resilient urban community**

One of the objectives of post-earthquake reconstruction is to build resilient communities. In order to achieve that, the following steps were taken by the Nepalese authorities:

### ***Enactment of basic by laws to guide post-earthquake reconstruction***

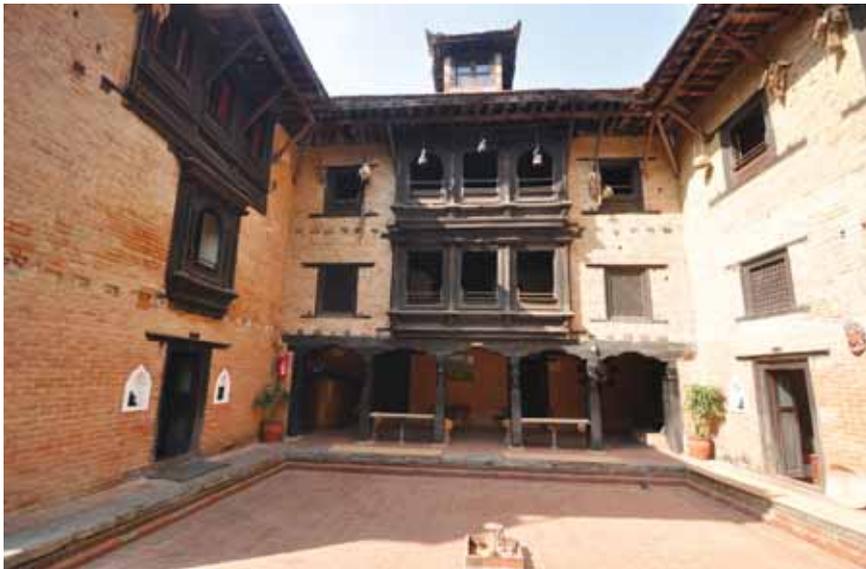
The government approved “Settlement Development, Urban Development and Building Construction Basic bylaws, 2072” on 30 September 2015 to assist local bodies like VDCs and municipalities in the rehabilitation and reconstruction of affected settlements.

### ***Institutional arrangement***

Institutional arrangements have also been envisioned for smooth implementation of the new laws. They include government bodies like Department of Urban Development and Building Construction, Ministry of Education, responsible for design and maintenance of hospitals, schools, government buildings, private houses, heritage sites, temples and shrines. Codes and regulations have also been developed to reconstruct, repair and maintain such buildings.

### ***Issues and challenges in the implementation of bylaws***

There are two challenges for the effective implementation of regulations. The first is the perception of the general public. People have not



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Typical courtyard surrounded by buildings with rich architecture

been able to understand the rationale behind the bylaws and its impact on public health and safety. The earthquake has shown that building safer houses is not adequate and open spaces are a must. Unless the community is safe, the residents are always vulnerable.

The second challenge is meeting the human resource crunch which has resulted in the low capacity of institutions. The newly formed municipalities do not have the expertise to monitor urban development activities, nor can they prepare plans for future development on their own. Frequent changes in staff and policies add to confusion among the staff as well as the people.

There are several overlapping roles and responsibilities of local and central governments. The weak coordination among utility agencies—water, electricity, telephone and roads—is visible in ongoing urban infrastructure development projects. Different agencies have their own work schedule, obligations, guidelines and regulations determining their performance.

### ***Culture of safety***

The principle of 'build back better' has to be injected in the construction techniques and in the mindset of construction workers, entrepreneurs and the common people. A culture of safety can be established if possible mistakes in construction can be avoided, remedial measures arranged and new techniques applied.

### ***Food security, sanitation and hygiene***

Reconstruction must also take into consideration of food security, sanitation and public health concerns.

Adequate food stock is a necessity to tide over disasters. Safe drinking water and a working sanitation system are a must when supply disruptions occur. In order to avoid epidemics, a separate contingency plan has to be prepared for drinking water and sanitation provisions.

### ***Open spaces***

Traditional Newari settlements of Kathmandu Valley were planned according to Vedic concepts. Depending upon their size, courtyards are named nani, bahi or baha. Elsewhere, certain open spaces are allocated for cultural and religious activities including ponds and lakes.

In modern urban planning, land plotting is done by government agencies, like town development committees or municipalities, and private real estate entrepreneurs. Residents are usually reluctant to keep open spaces near their homes because of concerns of misuse by criminals or garbage cleaners. Besides, any left out public space is witnessing a growing trend of encroachment by communities and the government to use them as playgrounds, police stations, local clubs, ward offices or religious constructions.

Housing developers have begun to allocate open spaces to meet regulations but they usually do so only in name by providing marginal open spaces or left-over land which are not user friendly, especially for women, children and the elderly. They may not even prove useful for emergency shelter.

Community organizations like clubs have also shown a penchant for encroaching public land for their own activities. Their non-concern for keeping open spaces is also echoed by government agencies who have

| Table Status of Reconstruction of Heritage sites |                           |                          |
|--|---------------------------|--------------------------|
| Sites  | No. of damaged structures | Reconstruction completed |
| Patan Durbar square                              | 27                        | 6                        |
| Basantapur                                       | 12                        | 6                        |
| Bhaktapur  | 19                        | 8                        |
| Soyambhu   | 6                         | 4                        |
| Pashupatinath                                    | 27                        | 2                        |
| Changu Narayan                                   | 5                         | 2                        |
| Other Heritage sites                             | 654                       | 28                       |
| Dharahara  | 1                         | not started yet          |

Source: NRA, July 2017

used their authority to occupy them in the name of public schools, police stations and health posts. Some occupation is temporary while some other have been occupied permanently. Whatever the justification, the result is that communities are deprived of the vital need for space.

## Heritage site protection

Kathmandu's heritage sites which suffered damage and destruction during the earthquake can be divided into three categories: world heritage, national heritage and local heritage.

The world heritage sites include Bhaktapur, Patan and Kathmandu Durbar Squares, Pashupatinath, Changu Narayan, Soyambhunath and Baudhanath. Dharahara, Durbar High School, Trichandra College, Singha Durbar and Rana palaces located in different parts of Kathmandu can be categorized as national heritage sites. Local heritage sites include shrines, temples, monasteries and *gumbas* built by people and maintained by the community.

The international community has shown concerns over delays in the reconstruction of heritage sites, but the government priority right now has been on housing the earthquake victims.

## Issues in heritage reconstruction

### a. Conflicting roles and responsibilities

There is ambiguity in the roles and responsibility of different agencies in the reconstruction works. In reconstruction of world heritage sites, donor countries like India and China have extended grant and loan support. The donors want to do everything on their own while the local government wants to be involved in the process. Citing their cultural rights, the local community has also joined them. Different government agencies too have differing claims over who should rebuild.

### b. Funding

Reconstruction of heritage sites is estimated to cost NPR 19.22 billion rupees, according to PDNA. Countries like India, China, and Sri Lanka have pledged support for reconstruction. However, fund management and procedural hassles have delayed the start of the reconstruction works.

### c. Technology and technical guidelines

Conflicting guidelines make reconstruction a complex affair. Experts, academicians, archeologist and bureaucrats debate on whether the damaged structures should be retrofitted or completely reconstructed. UNESCO has its own reconstruction guidelines regarding World Heritage sites. NRA's own Guidelines have to be followed at all other sites, not to mention the Ancient Monument Act and Regulations.

### d. Community participation

Since many temples and shrines belong to local communities, they feel that it is their right and responsibility to reconstruct it as per the traditional architectural norms. They are ready to raise funds and undertake the works themselves, but the local municipality and Department of Archaeology have reservation in transferring the responsibility to them. However, not all the community groups are organized for such tasks.

## Supply of construction materials

Supply of construction materials like seasoned timber, special bricks and stones is a major issue in heritage reconstruction projects as the available stock is not adequate. There is a need for increasing the production of such materials to accelerate the speed of construction.

## Rehabilitation of traditional settlements

The NRA has given high priority in the reconstruction and rehabilitation of traditional settlements like Sankhu, Khokana and Bungamati. In addition to conserving local art and architecture, these historic



Street in Bungamati after the earthquake



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Rehabilitation of traditional settlements are given priority not only to conserve local art and architecture but also because these historic settlements have a huge potential to attract tourists.

Rehabilitated courtyard in Lalitpur

settlements have a huge potential to attract tourists. The restored Newari settlement of Bandipur is a good example of conservation and development of old settlements, which could be replicated elsewhere during reconstruction. Awareness about tradition, technical support, soft loans and subsidy in building materials are required for that to happen.

### ***Reviving the core area of Kathmandu***

Kathmandu's core area was severely damaged by the time when the trend of demolishing traditional houses and constructing concrete buildings was speeding up. Existing open spaces, courtyards and alleys are gradually diminishing. There could be negative impact not only in the tangible heritage but also in intangible ones like festivals, jatras, dance and music. Intervention is needed at this stage to encourage reconstruction using traditional architecture, improvement of public spaces and courtyards and rehabilitation of water spouts and temples. This should boost local business and promote tourism and recreational activities.

### ***Complex land tenancy in traditional settlements, squatter settlements and slums***

There is dual ownership of land with both landlords and tenants enjoying the benefits in Newari settlements. Some land belong to *Guthi* (trusts), both public or private. The occupants of *Guthi* land pay their land revenue to *Guthi Sansthan* whereas those residing on private land pay the tax to their municipality. In dense areas, multiple families stay in the same building sharing the land, the staircase and the lobby. Meanwhile, the authorities provide separate

house ownership certificates to each household. In many cases, there is controversy over the ownership of public spaces such as courtyards, playgrounds and marginal land. In Kathmandu Valley, conflicting tenancy issues among central government, local government and local community have led to delays in development works.

### **Framework for urban planning for disaster preparedness**

#### ***Efficient road network***

Road networks should be usable for mass evacuation and relief operations. Intersections need proper planning to avoid congestion during disasters. Any road network consists of a hierarchy of alleys, single lanes, double lanes, four lanes, six lanes etc. Dead-end streets and single lane streets, without alternative parallel roads, are very dangerous during disasters. Many streets in Kathmandu Valley and elsewhere have dead-ends, which get blocked if a building along the street collapses. In planned cities, roads generally occupy 20-25 per cent of land-use.

#### ***Earthquake resistant housing and buildings***

It is the weak buildings that kill people, not the earthquake. Hence, reconstruction should result in earthquake resistant buildings. The National Building Code categorizes buildings into four types—State of the Art Buildings, Professionally Engineered Buildings, Buildings Constructed with Mandatory Rule of Thumb and Low Strength Masonry buildings for rural areas. Whereas the design and construction of new buildings should comply with the code,

## Reconstruction should result in earthquake resistant buildings as it is the weak buildings that kill people, not the earthquake.

partially damaged buildings can be merely repaired or retrofitted. Public buildings—whether owned by private or government—have to be constructed without compromising on the requirements of the building code. Community buildings such as schools, hospitals have to be retrofitted to make them ready for coping with disasters. School buildings should also function as emergency shelters during disasters.

### Emergency shelters

To cater to the huge number of people leaving their homes for safer shelter during disasters, the existing schools and community buildings may not be adequate to accommodate all. During the last earthquake, there was a high demand for temporary shelters. Emergency shelters should be constructed in each neighbourhood. Under normal circumstances, such shelters can function as party venues, futsal, indoor sports halls or community halls. Each neighbourhood or *Tole* requires at least one community hall.

### Firefighting system

Fire brigade is necessary not only during natural disasters but also during manmade disasters as fire risks are high at such moments. The deployment of fire engines at convenient locations should be given utmost priority. Fire hydrants must be installed on water mains at convenient locations.

### Open spaces

Open spaces also have a certain hierarchy—cluster or block level, neighborhood level, sector level and city level spaces. In a planned city four to five per cent of the total land use is allocated for open spaces. Such spaces must be accessible to all and cannot be occupied by any organization or group of people.

### Hospitals

Hospitals are under tremendous pressure, regarding space, manpower and logistics, during events leading to mass casualties. All hospitals, both private and government, should prepare their disaster management plan and train their staff accordingly. Regular fire and earthquake drills keep the management on their toes to cope with such eventualities.

#### Box Reconstruction of Pilachhen, Lalitpur

Pilachhen is a *Jyapu* neighbourhood at Ward 7 of Lalitpur Metropolitan City. It has rich culture and architecture. During the earthquake, 82 houses were completely destroyed. The *Jyapu* community got itself organized and launched Pilachhen Reconstruction and Tourism Project with the objective of reconstructing houses on the existing footprint with vernacular architecture and rehabilitation of existing courtyards, alleys and temples. Pilachhen Project can be a model for post-earthquake reconstruction of the heritage settlements.

The buildings are designed in such a way as to use the

#### Pilachhen Project can be a model for post-earthquake reconstruction of the heritage settlements.

ground floor for shops, first floor for home stay tourism and the second and third floors for private residence. Lalitpur Metropolitan City has approved the drawings and has waived the building permit fee. A financing scheme was developed with the consent of the house owners. The total cost of the project is NPR 460 million rupees.

Maya Foundation headed by Mr. Ramesh Maharjan,

a well-known diamond businessman, raised funds from local philanthropists for the reconstruction of the damaged buildings and provided two and a half million rupees. CE Construction, provided technical support by preparing the designs and supervising the construction. Renowned eye specialist Dr. Sanduk Ruit gave NPR 40 million rupees and the community has agreed to donate labour and kind equivalent to 25 per cent of the cost. Similarly, 25 per cent shall be borne by the households themselves and the remaining 25 per cent covered through a soft loan (2% interest) from commercial banks. If the manpower is not sufficient, extra craftsmen and labourers will also be engaged.



Bird's eye view of courtyard of Pilachhen, Lalitpur

## Policy recommendations

### Identification of open spaces

Existing open spaces in cities should be identified and recorded in the inventory. Such spaces may be:

- Privately owned—such as agriculture land, backyards, parking lots
- Owned by private organizations—such as driving courses, golf courses, play grounds
- Owned by government organizations—office premises, agriculture farms, stadiums, school and campus premises
- Owned by security agencies—*Tundikhel*, parade grounds,
- Owned by clubs—football and basketball grounds
- Owned by community—*bahal*, *bahi*, squares (*chowk*)

In order to meet the minimum standards of open spaces, local government should acquire private land/buildings. Kathmandu Valley Development Authority has prepared an atlas of open spaces in Kathmandu and Lalitpur. However, such spaces are occupied by government and private organizations. Such illegally occupied spaces must be cleared before going for acquisition or purchase of new land. Acquisition of land is a cumbersome process in Nepal and local governments alone cannot do it by themselves. The district administration should support the local government in the land acquisition process including fixing of compensation amounts. They are also responsible for providing security during demolition of illegal structures and site clearance. The design of the

open space should be made inclusive so that children, women and senior citizens can enjoy it.

### Demonstration model of reconstruction of heritage settlements

The historic settlements of Bungamati, Khokana, Sankhu, Dolakha and Nuwakot should be rebuilt to their original architecture and planning, but with improved construction technology. The old structures which were continuously repaired, maintained and even reconstructed by past generations, allowed the transfer of skill and technology to newer generations thus preserving the tradition. The reconstruction of such settlements should lead to tourism development and improve the livelihood of the residents. Public pressure to use modern concrete technology in the reconstruction of traditional buildings should be relieved by politicians and experts by convincing people on the value that aesthetic beauty provides.

### House pooling for revitalizing core area of Kathmandu

The concept of house pooling has been developed in many countries where traditional houses are dilapidated and unfit for living. The core areas of Kathmandu, Lalitpur and Bhaktapur are culturally very rich but threatened due to commercial activities. Vertical fragmentation of houses leads to narrow buildings with separate lobby and staircases but very narrow rooms. This has resulted in the encroachment of adjacent courtyards and destruction of cultural

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heritage—both tangible and intangible. The challenge, now, is to:

- build earthquake resistant, modern houses but by retaining traditional facades
- integrate the narrow vertical houses into horizontal flats with more space
- improve courtyards and public spaces
- renovate temples, wells, stone spouts and
- promote sustainable tourism and business activities
- promote home stays and handicraft shops etc.

The existing building code and legal framework allow house pooling in designated areas. However, since this is a new concept for us (similar to Land Pooling 30 years ago), social acceptance is an issue. Before building the entire city core, piloting should be done first involving one of the smaller courtyards. The pilot project would contribute to developing guidelines, manuals and procedures.

### **Water Supply, Sanitation and Hygiene (WASH)**

Contingency plans for safe drinking water and sanitation should be prepared to deal with emergencies, e.g. tube wells, rapid water treatment facilities, mobile toilets and excreta treatment technology.

### **Build back better**

The main principle of post disaster reconstruction is building better. It means rehabilitating and reconstructing the damaged structure so that it is stronger than before. In rural areas, where houses are constructed with stone, timber and mud, the salvaged materials can be used, but the construction technology should be improved to make it more disaster resilient. In reconstruction of the rural areas,

industrial materials are not sustainable in the long run. Indigenous materials and technology get handed over from one generation to another and keeps the community well aware of the issues involved. Moreover, it ensures preservation of local architecture and culture.

### **Resettlement of disaster affected communities**

Relocation of settlements consists of land acquisition, provision of basic services, land subdivision, allocation of housing plots and construction of community buildings like health centres, schools and private houses. The relocated community must be disaster resilient and prosperous. Political meddling and social conflicts are serious challenges for that to happen.

### **Individual versus community**

The overarching objective of the reconstruction and rehabilitation policy is building safer sustainable, resilient and inclusive communities. For this, the whole planning process should revolve around community development rather than earthquake resistant building construction. While planning for a resilient community, there should be a balance between private space and public space. A new culture of thinking about how to make the community safer rather than just making their individual houses safer needs to be inculcated in people.

### **Apt opportunity for review**

Reconstruction is an opportunity to create new resilient urban communities and to improve existing communities. It is an opportunity not only to recover from the earthquake but also to be prepared for the next disaster. A workable disaster management plan has to be implemented by a responsible team. Since the first response to disaster takes place at the community level better planning and preparation at the community level results in less damage, quick recovery and early rehabilitation. ■