

Formulating Time Tested Knowledge for Sustainable Disaster Risk Reduction; A Case Study of Kathmandu

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Synopsis

This study attempts to analyze time tested knowledge inherent in traditional practices for seismic disaster risk reduction of urban communities in Kathmandu, Nepal. The use of disaster risk reduction knowledge can be conceived both in traditional settlement planning and socio- cultural practices which are parts of life of local people. The potential role of urban ritual as town watching exercise to create awareness about vulnerable areas in the neighborhood and resources to cope with natural disaster risk is discussed in this study. The opportunity for observational learning provided by urban rituals about urban open spaces which are useful during emergency situation is an important aspect of indigenous knowledge. The study findings illustrate seismic disaster risk reduction knowledge inbuilt in local practices as a part of social life which people have been adopting unconsciously over several generations.

Keywords: Earthquake vulnerability, time tested knowledge, town watching

1. Introduction

Defining time tested Knowledge

'Knowledge' implies cognition; the fact or condition of having information or of being learned through experience or association (Websters, 2000). It refers to the whole system, including concepts, beliefs and perception, and the processes whereby it is acquired, augmented, stored and transmitted (Chambers R., 1983).

Several definitions of knowledge exist but defining the term time tested knowledge is not simple as it seems. Literature on time-tested knowledge for disaster risk reduction is rare as most of the knowledge is located in people and rarely written down. The present study refers to time tested knowledge as practice and culture which develop from an advanced understanding of a specific environment which has formed over numerous generations of habitation. Such

knowledge is cumulative, representing generations of experiences, careful observations, and trial-and-error experiments. The extended period of time a community has existed in a given environment expands the knowledge that comes from experience and practice. These two characteristics—the local environment and the element of time are also common to many definition of indigenous knowledge available in literature on anthropology, development and ethno-science. The holders of such knowledge are men and women indigenous to a particular geographic area (Granier L., 1998). Dekens (2007) mentions that to understand local knowledge one has to understand and account for people's practices and beliefs, perceptions and values as understanding all these is crucial because it can explain why people do things the way they do.

Time tested knowledge includes different knowledge types as local technical knowledge including local methods of construction. Aside from

this there are other types of knowledge as environmental knowledge, socio cultural knowledge and historical knowledge. The non structural knowledge isn't easily identified by outsiders as it is closely embedded in people's livelihoods and world views.

This study investigates about the time tested knowledge adopted for seismic disaster risk reduction in the case study area at Lalitpur in Kathmandu. Within the time tested knowledge framework, local technical knowledge such as local construction methods and non structural knowledge such as social practices indirectly contributing towards seismic disaster risk reduction is discussed in the context of the study area described below.

2. Study Area

Lalitpur, one of the old cities within Kathmandu Valley, is a dense urban area. The total area of Lalitpur municipality is 15.4 square kilometres and constitutes a total of 22 wards. The population density varies from around 540 person per hectare (pph) in the core area up to 46 pph in the outlying areas of new urban development (LSMC, 2008). The present study focuses on densely inhabited areas of Ward 16 and 18 of Lalitpur City with total households of 989 and 1287 respectively. It is predominantly inhabited by indigenous `Newar` people on housing clusters laid out around open courtyards. Similar to other Newar settlements, it is common to observe regular cultural function like ritual in the study area. In one of the annual ritual procession, man made chariot is pulled along the city streets involving a wide participation of local residents. Most of these processions circumambulate the dense city areas connecting several ordered spaces within Lalitpur such as outer city spaces, courtyards within residential accommodations and wider street nodes along the route. The configuration of chariot festival route (Machhendranath jatra) and palanquin festival (Bhimsen Jatra) is shown in Fig.1.

The following attributes were sought in the target communities in order to maximize the effectiveness of task to formulate time tested knowledge:

- Good repository of traditional knowledge.
- Experiences of hazard including earthquake and related events.
- Some degree of openness to outsiders.

- Active representatives from community level disaster management committee.

3. Study Methodology

In order to formulate time-tested knowledge inherent in indigenous community of Lalitpur, the overall strategy was to build respect and greater understanding between outsiders and the community.

The study tries to revive and promote knowledge in disaster risk management existing in the community. To achieve this aim, a mix of methodologies was adopted for the study which included physical observation, interviews, focused group discussion and mapping. Field surveys have been conducted extensively to visit and study urban ritual routes and neighborhood spaces.

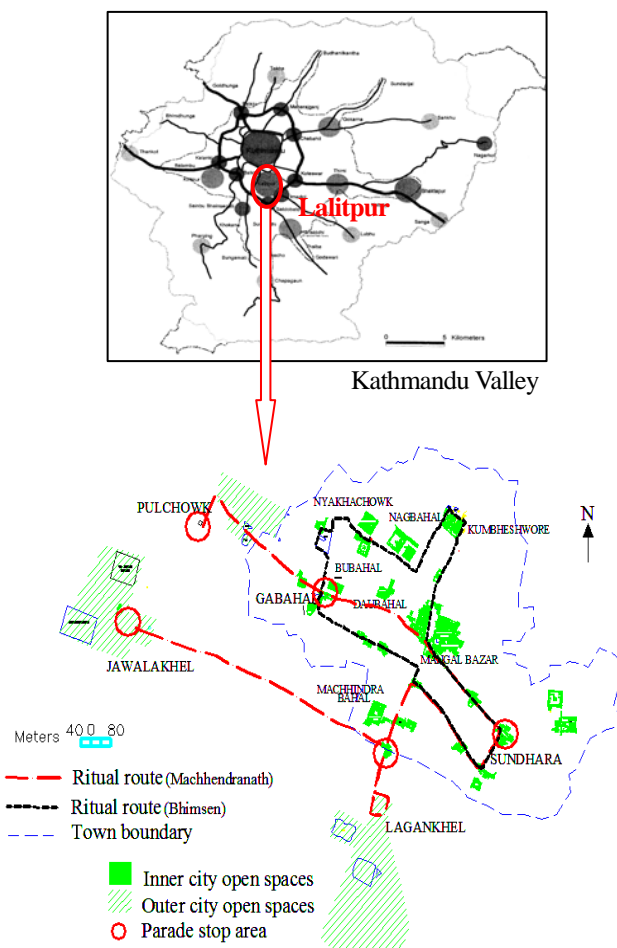


Fig 1: Ritual routes and open spaces in Lalitpur, Nepal (Base map Source: KVMP, 2001)

People and their daily activities were observed, and the first author of this study attempted to shortly

experience local people's life. The experience of living in local communities took place nearby the study area. All this gave the author valuable insight into local socio-cultural practices. The field work included meeting with members of local disaster management committee, interviewing elder people, talking to local people in accommodations with open residential courtyards, in shops and out on streets. Interviews were conducted with key informants to know about past experiences of earthquake, response and recovery from such natural disaster. Also, elder people in the community were inquired about the use of urban open spaces during past seismic disaster.

4. Study Findings

The following section describes about the preliminary findings from the study which focuses on indigenous knowledge and practices that has prospects for reducing the impact of natural disaster like earthquake in Lalitpur area. These are broadly classified into:

- Tangible practices (Indigenous building and planning practices)
- Non tangible practices (Socio cultural practices)

Tangible practices

At physical level, urban settlement in Lalitpur is organized into various neighborhood units named *tole* locally, and are linked by a hierarchy of streets and open spaces, some of which are procession routes for various rituals. Traditional neighborhood boundaries have been defined according to open spaces, which are linked to a particular social group within community and their association with a local landform, through which they physically identify themselves with that space. The spatial extent of these neighborhood units can be defined by various characteristics; for example by a series of houses joined wall to wall along the street, by a built form surrounding a water structure, or by a built form enclosing an open area. The morphology of settlement represents a hierarchy of public, semi-public and private open spaces, which is typical of a *Newari* Settlement. The sequence of open spaces are very much part of the life of the people for carrying out daily activities and rituals. They are also crucial for emergency escape in the event of an

earthquake though escape during earthquakes may or may not be the conscious design factor behind evolving such morphology. The settlement is defined by built forms of different types and linked together by a network of streets.

The open spaces are often named according to their function; for example, courtyards of monasteries are called "*bahals*" and "*bahils*". There are some special public land belonging to various caste groups of the community or to temples and monasteries. They are called "*guthi*" land, the product from them are used during festivals or funerals for holding community feasts and for maintaining temples and monasteries. Besides, traditional compact settlement planning with settlement boundaries helped to preserve agricultural land thereby protecting primary occupational base of the local people. The traditional city dwellers were self sustained in food products which helped them to survive in the event of natural disaster such as earthquake for a longer period without assistance from other organizations.



Fig 2: Open space around residential accommodation of a neighborhood in Lalitpur.

Traditional building practice in the study area reveals the existence of sufficient knowledge to adapt to seismic hazards. Such building culture must have emerged as a direct consequence of adjustment to disaster losses incurred by the local population across space and over time. Also such practices are friendly to the local context through the extensive use of local materials, skills and resources. The construction methods are likely to reflect local cultural values, reduce the threat of seismic risk to lives of people and address the specific needs of the population. Apart from this, local buildings possess a high salvage value

and materials can be reused for reconstruction. Evidences also show that rebuilding after the catastrophic earthquake in 1934 A.D was carried by reusing the local materials and local skill. It helped in quick recovery of urban built environment after natural disaster.

Many studies have shown that traditional construction methods are likely to outperform their modern counterparts in regards to earthquake vulnerability. Several details and design methods have been developed over years to deal with earthquakes in traditional buildings. A fair level of earthquake resistance is derived from symmetric plan configuration, symmetry in positioning of openings which helps reduce torsion during earthquakes (Fig. 3). The residential building structure has a central spine wall parallel to the exterior long wall and the sidewalls. The layout of floor joists and continuous wall tie or plate and the way they are connected to the wall effectively distribute the stresses over the whole building. The brittle failure and collapse through mass action associated with heavy brick wall in mud mortar, which must have been observed by the builders early on, appears to have led the builders to use timber ring ties held tight by tightening wedges. This has contributed in adding shear strength to walls on the one hand and on the other effectively split the brickwork into several masses, both aspects reducing the vulnerability of brickwork to earthquakes.



Fig 3: Symmetric residences with timber ties on wall

Non tangible practices

In the field of disaster risk management, there is a growing realization that technology alone will not be able to reduce disaster loss. Despite advances in technology, vulnerability to and the risks from natural hazards have been rising in the developed and developing countries- and this may be the case even with the frequency and magnitude of hazard events

remaining constant (Gardner 2002; c.f. Dekens 2007). What has been increasing is not the number of disasters as a result of natural hazard per se but the impact of these events on people and property (Twigg 1998; c.f. Dekens 2007). Thus, there is a need to take the human dimensions of natural hazards into account (including local knowledge, practices and perceptions) in disaster management. In the context of natural disasters, certain ideas and practices are prevalent in the society whether in formal instruction or in the course of every day practice. Such shared ideas and mode of conduct inherent in cultural life of local people are crucial societal resources in coping with diverse contingencies. This study attempts to investigate the capacities of people inbuilt in the cultural life that helps them to cope with natural disaster risk.

In the later part of this paper, annual local festival such as chariot pulling event and parading around town spaces is explained in relation to a town watching practice and disaster risk reduction.

Urban ritual, town watching and scope of observational learning

Town watching uses observation as a tool in the process of raising the level of awareness of participants about their surrounding (Ogawa et.al, 2005). Before drawing an analogy between ritual event and town watching it is important to explain the ritual event in more detail. The voluntary participation of residents in walking around the city along with a mobile chariot is the major component of ritual event named Machhendranath. The event is stopped at several areas where participants from respective neighborhoods gather to pay homage to the ritual chariot.



Fig 4: Chariot pulling festival in Lalitpur, Nepal

As a part of the event, citizens organize combined catering at their own neighborhoods. Active interpersonal communication takes place along the parade route in front of households and open courtyard within accommodations. Sufficient scope exists for participants to observe and interact with the built environment which is the prime aim of town watching. It also provides an opportunity for behavioral learning through different sub processes of attention, retention, production and motivation.

During the ritual parade, live audiences gather willingly on city streets to observe a 65 feet tall chariot which becomes the focus of attraction (Fig 4). This setting of the event draws attention of participants and they get involved in the observational learning. Through this process, participants develop mental maps by perceiving space and such spatial cognition is a vital skill for disaster/emergency planning. The ritual parade helps people to understand area's geography, which allows them to focus their attention on how to evacuate during disasters such as earthquake or fire.

An extensive field survey was carried out among local respondents to check whether rituals helped to build awareness about various open spaces and routes. Around two hundred and eighty five local respondents of Wards 16 and 18 of Lalitpur City were asked, 'where will you evacuate during earthquake or fire?'. More than a half of the respondents (57.2 percent) replied that they would evacuate to city open spaces (most of them located along the parade route). Among the other responses are; private courtyards within accommodations (20.4 percent), kitchen yards (13 percent), school yards (1.8 percent) and 7.7 percent mentioned they don't want to evacuate. The survey result hints that many residents are aware about city open spaces for evacuation during disaster. In order to identify whether the familiarity of these spaces is related to involvement in ritual, the respondents were asked 'What keeps them familiar with the open spaces?', the largest number of respondents (around 37 percent) mentioned that social activities like rituals make spaces familiar to them. The other reasons included are; proximity of open spaces (26 percent); location of landmark feature like rest houses or memorials (21 percent); opportunity of daily interaction on open space (15 percent). The result suggests that ritual has a strong impact on local people to build a mental image of urban open spaces.

This finding has been made further robust by a participatory mapping exercise organized by one of the authors with respect to open spaces and evacuation routes among a group of local people and members from community disaster management committee in Ward 16 and 18 of Lalitpur (Fig. 5). The mapping exercise was facilitated by one of the authors along with representative from local NGO, NSET (National Society for Earthquake Technology) and building safety expert from city municipal office of Lalitpur. While mapping the access to the identified evacuation spaces in the neighborhoods most of the participants chose the route from their place of stay which basically matches part of the ritual route in the city. People are well acquainted with the route for several reasons. Firstly, being a ritual route it is the most auspicious pathway which exists in the memory of people.

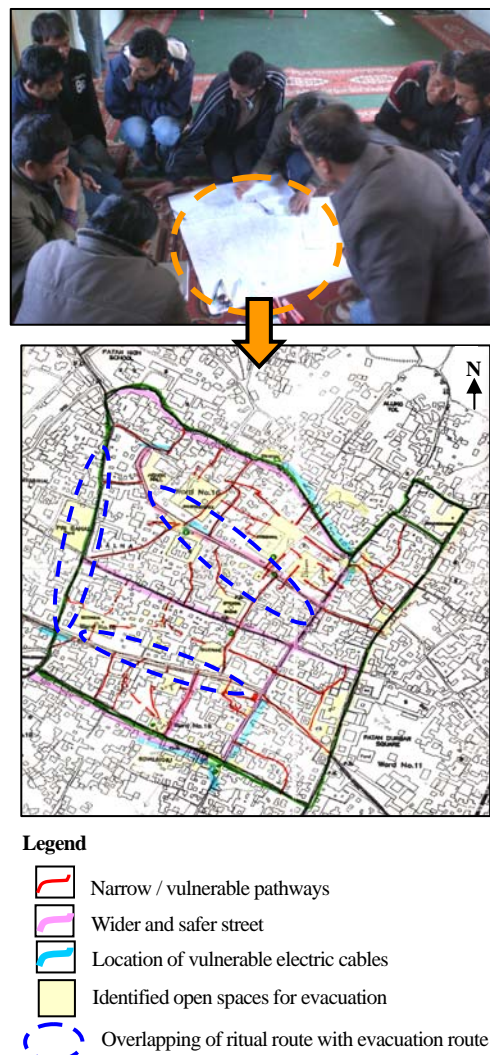


Fig 5: Participatory mapping of evacuation spaces and routes in Ward 16 & 18 of Lalitpur, Nepal

Besides, repeated participation in ritual event that leads through different open spaces are likely to influence residents' cognitive capability via a cumulative process of observational learning which may have led to retention of observed phenomenon. We can find observational learning about urban open spaces at two levels and on different scales. First, by daily activities such as social interactions and more regular rituals people get familiar with the open spaces in their immediate surrounding that are quite useful during emergency cases for escape at neighborhood level. Second, people get familiar with larger scale picture of spaces in the town through annual or seasonal rituals which are analogous to town watching. Both the rituals on different scales complement each other and contribute in observational learning about open spaces useful during disaster.

Motivation to preserve the open spaces is observed during informal interviews by one of the authors with residents in the study area. Routinely cleaning and maintenance of multi functional open spaces is carried out by residents. The moral conduct developed by the social norm which regards space encroachment as a crime is the self incentive that motivates people to engage in this behavior. From these findings we may well claim that the urban ritual as a model event has initiated and continuously contributed to the behavioral learning process and reinforced social action to preserve open spaces that are useful during disasters.

It can be well claimed scientifically that these open spaces can serve as evacuation areas during natural disaster like earthquake. The selected open spaces by local residents as evacuation areas during participatory mapping were also agreed upon by scientific experts who included disaster scientist from a local NGO and city planners from the municipal office. The experts mentioned that the selected evacuation spaces were suitable for disaster like earthquake in terms of the availability of infrastructures such as wider roads, public shelter and public water supply. The large size of the open spaces and its close proximity from all the households made them functionally sound as evacuation spaces.

Apart from this, sufficient local support for disabled or aged people for evacuation is possible as the community is very closely knit and people are quite familiar with each other. These open spaces also

overlap with areas where people carry out ritual functions. In this way, we can observe a close relationship between open spaces and ritual function which coexist with each other. This in turn enables residents by keeping them familiar with city open spaces and city routes through observational learning that are useful for life saving during disaster like earthquake.

The ritual activity is an indirect means of repeated communication and active participation for local residents to get informed about and manage their surrounding spaces such as ritual routes and open spaces. At the same time, these practices are also related to space cognition and ultimately helping to build the community coping capacity against catastrophic event like earthquake.

5. Conclusion

This paper discussed on traditional knowledge inherent in urban settlement planning and local socio-cultural practices, and how it can contribute to natural disaster risk reduction. The urban ritual in Lalitpur is analyzed as a model event in observational learning. The findings suggest that urban ritual plays a significant role in building mental image of urban open spaces and motivates people in preserving these spaces. Though not designed as a risk communication medium so intentionally, there are good reasons to hypothesize that the traditionally repeated voluntary involvement of city residents annually in various city spaces over a long period of time makes it an effective platform for social marketing of disaster-related risk reduction measures, particularly effective for rare event disasters, for which common people may not be able to maintain their coping capacity against risks. Further empirical study is needed to investigate about this potential role of ritual event as a learning tool for outreaching the urban communities at risk in Lalitpur.

It is widely criticized that indigenous or traditional knowledge is often so specific to a locality that it isn't always universally applicable. The second challenge is how to integrate indigenous knowledge into mainstream disaster risk reduction policy and practice. Study is conducted to analyze indigenous knowledge that proved successful in mitigating the effect of disaster in case study area. Indigenous knowledge is the product of generations of intelligent

reflection tested in the rigorous laboratory of survival. There is a need to extract core categories of knowledge which have a more universal application. Such indigenous knowledge can be combined with contemporary method of hazard mitigation to create an educational tool for disaster reduction. Educational tools for schools and communities about effective actions to be taken in response to an earthquake can be developed using the traditional knowledge. A number of traditional tracks and trails exist in the area which can be used for evacuation away from the hazard area, and ritual practices can be developed as educational tool to create awareness about mass evacuation. Using local tradition as a starting point to establish dialogue between scientists and local residents will help to build trust and make the risk communication process more effective. It is equally important for local inhabitants to realize the benefits of disaster risk reduction measures so that they will be motivated to take action to cope with disaster. Hence, formulating disaster risk preparedness and response policies incorporating indigenous practices will help in social implementation and sustainability of disaster risk reduction efforts.

References

- Bandura A. (1977): Social Learning Theory, Englewood Cliffs NJ, Prentice Hall 1977
- Chambers R. (1983): Rural development, putting the last First; Pearson education limited, England
- Dekens J. (2007): Local Knowledge for disaster preparedness; A literature Review: ICIMOD, Kathmandu, Nepal, June, 2007
- Grenier L. (1998): Working with Indigenous Knowledge; A guide for researchers; Ottawa, Canada: IDRC
- Karababa F.V. & Guthrie P. M. (2006): Vulnerability reduction through local seismic culture, the case study of Lefkada Greece: IEEE 2006
- Ogawa Y., Fernandez A. L. & Yoshimura T., (2005): Town Watching As a Tool for Citizen Participation in Developing Countries: Applications in Disaster Training; International Journal of mass emergencies and disasters, Vol. 23, No .2
- Webster's New Collegiate Dictionary (2000)

持続可能な防災のための伝統的知識の体系化：カトマンズを例に

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要 旨

本研究は、ネパール国カトマンズのコミュニティーで伝統的に形成されてきた地震防災に関する知識について述べるものである。通常、防災に関する知識は、いわゆるまちづくりと地元住民にとっての生活の一部である社会文化的な慣習とを考えることができる。本稿では、地域の脆弱性を発見するためのまち歩きとしての側面及び自然災害に対処するための人的なつながりの側面に注目して都市域における祭りについて議論する。まちを練り歩く祭りが災害時に有効に活用できる空き地を発見する機会にもなるのは、地域固有の知識の重要な側面である。本研究の成果として、地域の慣習と無意識に引き継がれてきた生活様式に埋め込まれた知識が明らかとなった。

キーワード：地震脆弱性, 伝統的知識, まちあるき