Mainstreaming Resilience of Schools:

Rebuilding in Post Gorkha Earthquake Nepal

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Abstract

This study helps to identify practical approaches for embedding resilience in the reconstruction of schools damaged by the Gorkha Earthquake of April-May 2015. Schools must be rebuilt to provide education as the foundation of building resilience. They must also have basic amenities such as drinking water, toilets, waste disposal and drainage systems. The reconstructed school must be physically safe from both geological and climatic hazards. Building resilience will involve incorporating processes to ensure that schools function regularly in the immediate aftermath of a hazard and rebuilding is done in a manner that addresses identified vulnerabilities. The findings are expected to inform opinion, and lead to policy uptake and actions for reconstructing schools and help to promote resilience through: i) reduction of multi-hazard risks, ii) child-friendly learning environment, iii) integration of landscape, environment and culture, and iv) community ownership.

Table of Contents

CHAPTER 1

Introduction

Background

The terms build back better and resilience have become buzzwords in public discussions in Nepal after the Gorkha Earthquake. Both terms, however, raise some basic questions: how does one build back better and resilience against what? The first term is clearer in terms of an earthquake though how would better rebuilding happen is critical. Clearly, the quality of rebuilt structure should be safer, with appropriate aesthetics and better managed than the pre-damage condition. The idea is to ensure that the structure is not damaged when there is another hazard. What resilience means is not very clear, however. What are we building resilience to reduce – the impact of increasing climatic extremes, floods, landslide, droughts, energy shortage or earthquakes?

The concept of resilience emerged from the purview of ecological sciences[1] and was later applied to the social context. It is a useful term to examine why some ecological and human built systems collapse when they encounter shock, and some do not. The insights from this examination can offer pathways for determining the process of adaptation to changing circumstances, or recovery from disaster. An ecological unit, say a forest can regenerate automatically after a forest fire and gradually attain its earlier character. This is not the case with social systems, given the ability of human beings to think and make choices.

At what scale should resilience building be considered is equally important: individual, household, community, government, business or national. Another issue relates to human built systems and mechanisms people have created and use in their daily life to deal with various climatic and non-climatic hazards. The conceptual understandings of resilience, encompassing these concerns, will be discussed in detail later.

The 2015 Gorkha Earthquake seriously affected social, economic and ecological aspects of the 14 districts in Nepal's central region and also caused a rupture in the governance arrangements. Hundreds of thousands people in a large area were simultaneously affected within less than a minute and without warning. The impact was at the individual, household, community, government and business levels. The quake also impacted natural ecosystems, built infrastructures such as roads, electricity systems, heritage sites, private buildings and schools; as well as different development sectors.

The earthquake occurred on Saturday when public schools were not in session. Still, according to the Education Cluster's assessment of June 2015, 479 students had died in schools or hostels. Had the earthquake struck on a weekday, communities could have lost many school age children in the collapse of school buildings. That had happened in Muzafarabad 10 years ago in 2005 when 70,000 students perished when poorly built schools collapsed following a 7.6 magnitude earthquake.[2]

Schools, education and disasters

This study is aimed at unpacking the idea of the understanding of resilience for rebuilding schools and seeks to propose a practical way forward. Given the multiple hazardous that Nepal is prone to facing and the possibility of the country being hit by a similar high intensity earthquake, now is a historic opportunity for incorporating resilience to respond to earthquake and other hazards. This study is guided by the idea that resilience is based on communities engaging each other as knowledge seeking, skilled, productive, interdependent and self-reliant entities. Though the current context does not inspire confidence as more than a year after the earthquake, thousands of families continue to live in temporary shelters[3] while classes are being conducted in Temporary Learning Centers (TLC). Yet it is important to discuss resilience to ensure lessons that can benefit Nepal by rebuilding schools as safe and vibrant centers of learning.

According to the Post Disaster Needs Assessment (PDNA), the Gorkha earthquake damaged 7,000 schools across the country (NPC 2015). The Ministry of Education (MoE) has estimated that earthquake damaged five thousand schools with 18,147 classrooms in need immediate support for reconstruction (MoE 2015).[4] The five-year plan for post-earthquake recovery and reconstruction, prepared by the National Reconstruction Authority (NRA), estimated that between 2016 and 2020 about 124,446.10 million Nepali Rupees would be needed for rebuilding schools (NRA 2016). The NRA has approved reconstruction plans for 234 schools, and has estimated that an (additional) investment of NRs. 1,726.74 million would be needed.[5]

One can hope that support for rebuilding damaged schools will be guided by the principle of building back better not just in the reconstruction of damaged buildings but also in in terms of other services needed for holding regular classes such as functioning drinking water systems, toilets, rainwater drainage and solid waste disposal. Schools buildings must be safe from potential hazards, comfortable, accessible and culturally appropriate. Reconstructing schools is a community learning opportunity to better understand risks, collectively commit to safety, and to learn and apply strategies for safer construction. Safe building, services and learning ambience are essential elements to ensure the quality of teaching and learning. Given the damages to school buildings and school-based services in the earthquake, it is important to identify the factors that heightened the damages. This study has examined these factors in relation to rebuilding damaged schools. The following questions guided the study:

1. How safe are schools against exposure to risks from multiple hazards in Nepal?
2. What are the health and safety concerns relating to school buildings and services?
3. What has been the role of government agencies, school administration and the community members in improving the safety of school buildings, delivery of services, and the teaching and learning environment?
4. How can school buildings and services be made more resilient to risks from multiple hazards? and
5. How can the processes and approaches of post-earthquake reconstruction be streamlined so that school buildings are built better, and service delivery is improved?

The answers to the above questions will help meet three objectives. First, they will help towards reconstruction of school buildings with safety as a prime requirement. Second, they will help in incorporating elements of resilience as school buildings are reconstructed while strengthening relationships among government, communities and school management. Third, the answers are expected to help in formulating strategies to systematically incorporate resilience in schools across the country, including those not affected by the April 2015 earthquake.

School Infrastructures and Services

Nepal has both private and community schools. These two types of schools vary in terms of quality of the buildings and services as well as the education they provide. Most schools in rural areas are poorly built and have low quality of services resulting in substandard education.

Earthquake damaged school

In 2011, Nepal had 190,667 school buildings of which 26,969 were community schools. Of the total, 62 percent were in good condition while 38 per cent required major renovations. Of 201,940 classrooms, 94 per cent were used for teaching and learning. Of the classrooms in use, 29 per cent were in serious need of renovation and upgrading. Among community schools, 80 per cent of schools had toilets, 65 per cent had separate toilets for girls and 77 per cent had access to drinking water (DoE 2012). Although the statistics do not reveal quality of the school buildings and services, it can be inferred that both are deficient at community schools. Their maintenance is also inadequate.

In 2012, the Government of Nepal (GoN) endorsed the National Framework for Child-friendly Schools for quality education. This framework recognizes the quality of school buildings, classrooms, library, laboratories, furniture, education aid, playgrounds and services such as water supply, sanitation, waste management and rainwater drainage, all of which are fundamental to a child-friendly learning environment. The framework also sets minimum criteria to assure child-friendly school buildings: safe from earthquakes; with roofs that prevent heat, cold and rain; plastered walls to ensure a dust free environment; and doors and windows within reach of the students and capable of providing enough light and ventilation. Unfortunately, these standards are rarely met in community schools. Even where the size of investment in the school buildings is large, the quality of the built structure and services are not child-friendly (MoE 2010).

Poor quality school buildings and inadequate services adversely affect the learning atmosphere. Many school buildings in earthquake-affected districts were constructed with rubble stone masonry in mud or cement mortar with shallow foundations. In most cases, Corrugated Galvanized Iron (CGI) sheets, stone slabs or slate were used as roofing. Most school buildings were constructed in stages: one or two classrooms were constructed first; more classrooms, other facilities and services were added later.

The quality of school buildings also depends on the amount of financial resources available for construction and the way these resources are mobilized. There are, in general, four ways financial resources have been mobilized for the construction of school buildings and services: i) grants from the GoN, ii) community contribution, ii) charity and philanthropic contributions by individuals and organizations, and iv) grants made available by aid agencies and development organizations.

While some level of planning, design and construction supervision is integral to the process when funds are made available by the GoN and aid agencies, schools built with charity, community or philanthropic contributions are largely ad-hoc. When a community school is established in a rural area, the focus is on simply erecting a skeleton of a building to serve as a teaching and learning space. Services, lighting, ventilation, aesthetics, environmental comfort and safety are not considered important. Even when reinforced cement concrete or masonry elements are used, the detailing is deficient, material mixes uneven and quality control poor. The prevailing conception is that cement concrete, when used with reinforcement bars, produces stronger buildings, regardless of the detailing, material preparation and workmanship. The classrooms, library, laboratory, staff rooms and other elements of the school buildings are poorly laid out. Compromises on lighting, ventilation, thermal comfort, spaces for entry and exit, emergency escape are obvious in most rural school buildings that also lack basic support elements necessary for a healthy learning environment.

There are many reasons why safety, comfort and the quality of the learning environment in rural schools are neglected. The first is the focus on increasing the number of schools, rather than increasing the quality of education. Driven by the agenda of "education for all" the GoN has focused on increasing the enrollment of students in the primary and secondary levels. The emphasis is on increasing the number of schools and classrooms while functionality of the buildings, ambience for teaching and learning, comfort and safety are accorded low priorities. Services such as drinking water supply, separate toilets for boys and girls, waste management and rainwater drainage are inadequate. In cases where drinking water supply systems and sanitation facilities exist, they are poorly maintained and the level of services they provide is deficient. It is estimated that 89 percentage of school buildings in Nepal are made of load-bearing masonry, without earthquake-resistant elements and that in hilly regions more than 50 percent are the most vulnerable masonry type with rubble stone construction.[6]

The second is the phased construction of school buildings that do not follow a plan. Typically, in rural areas, construction of schools starts with a rudimentary facility; one or two rooms are built to initiate classes. New rooms are added later when need arises or as resources become available. The third is the inadequate financial resources for constructing the school buildings. The fourth - given the remoteness of the site - is the lack of availability of skilled labor and technology. The fifth is the lack of capacity to follow standard engineering design and construction practices.

Further, the sixth reason is the absence of scientific culture and technological ethos in Nepal's larger socio-political realm. This factor is an outcome of the historical process when modern technology arrived in the country in the late 1800 and early 1900 for use in the interest of comforts for the ruling Rana family rather than to enhance the production function of society. Modern drinking water, electricity and irrigation systems were built to serve the ruling class. The notion of repairs and maintenance of built infrastructure are not ingrained locally. The specific example of school buildings is also one reflection of this larger context.

School buildings are also used as spaces to hold social meetings and to organize community services such as health camps, public awareness programs and as a polling station for national and local elections. Sometimes, local cultural activities are organized in these premises because alternatives are not available. Yet, when a plan to develop or rebuild a school is made, these uses are not considered.

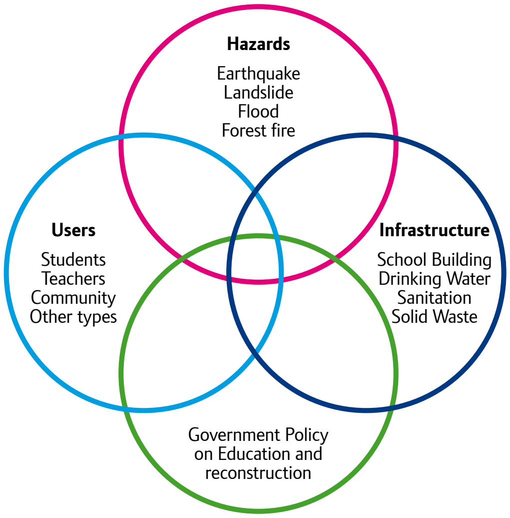
Conceptual Framework

The conception of resilience in this study can provide a window of opportunity to build back better schools. According to the Global Resilience Alliance (GRA), "resilience is the ability of a system to absorb disturbances, to change and then to re-organize and still maintain the same identity, retaining the same basic structure and ways of functioning". Resilience can alternatively be defined as the ability of system to recover from the shock while enhancing the capacity to withstand the future shock (ULI 2014). These definitions, while useful, are incomplete when examined from the perspectives of the Gorkha Earthquake.

Unpacking the idea of resilience can help identify deficiencies in school buildings damaged by the April earthquake and how they should be overcome during reconstruction. An approach that identifies and incorporates these elements would be of interest to the government, the local community, parents, teachers, students, the larger society, and funders. Everyone expects schools, office buildings and private dwellings to be safe from earthquakes, and from other natural and manmade hazards. The idea of safety needs further elaboration. How safe is safe? It must be recognized that no building or infrastructure can be made totally safe or fail proof to hazards of all types and magnitude.

A building or an infrastructure is a physical entity designed and built with chosen materials, technology and functionality, which determine its performance. A building can be built to withstand high intensity hazards

Conceptual Framework



Adapted from ISET-Nepal (2013)

if all factors likely to cause failure are incorporated in the design and construction. But it cannot be guaranteed that an infrastructure designed with high factor of safety will be fail-proof to all types of hazards though incorporating such design considerations would incur additional costs. They can, however, be made 'fail-safe'.

A fail-safe school building when faced with a shock will not collapse instantaneously or failure in one component of the building would not cascade to its ultimate collapse and cessation of services. If cascading failure is to be avoided, it will be necessary to provide additional safety elements in the design of the physical system. The additional elements bring in the idea of redundancy embodying spare capacity in the system for contingency situations. It is the capacity to accommodate increasing, extreme pressure or demand put on the system. Such a capacity not only will contribute to fail-safe character but also provide multiple pathways for service delivery when a hazard strikes.

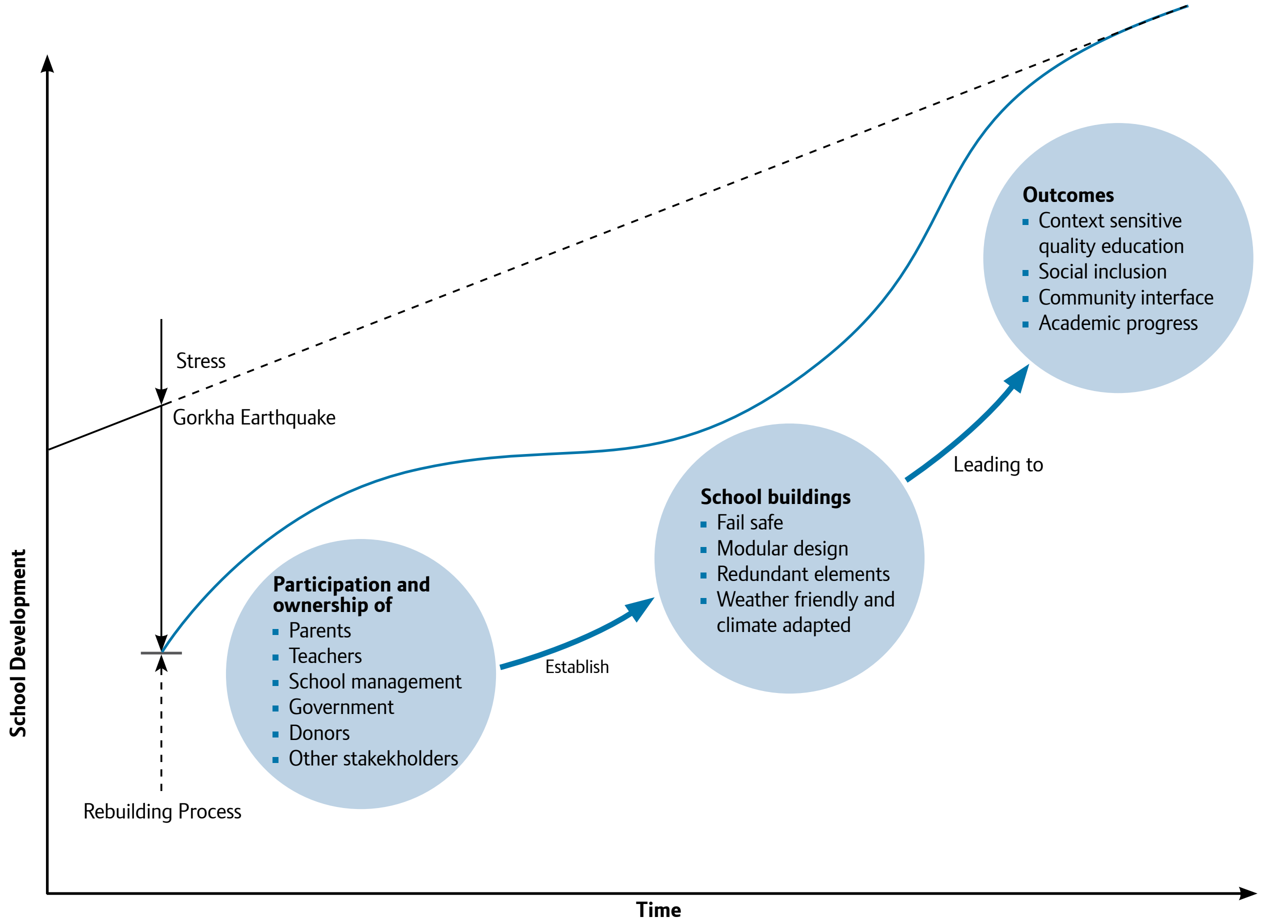
If concepts of fail-safe and redundancy save lives and provide multiple pathways for service delivery, the idea of modularity helps in quick rebuilding and restoration

Temporary learning center

while avoiding vulnerabilities that emerged in the earlier hazard. A school building could be planned, designed and constructed with standardized components of similar parts that can be replaced quickly if one or even many may fail. Modularity would enable damaged components to be replaced quickly and optimize the cost of replacement. Introducing modularity into the design and rebuilding of schools needs enhancing of local capacity to take decisions and act. Thus, the ideas of fail-safe, redundancy and modularity can help avoid serious failures while simultaneously minimizing new sources of vulnerability in disaster recovery. While introducing and establishing these ideas in social systems may take time, they are nonetheless useful components for building more resilient school buildings.

Fail-safe, redundancy and modularity are characteristics of the physical system, a built infrastructure. However, resilience cannot be built if human aspects of decision-making and users of school buildings such as students, teachers and parents are not considered in the process of recovery. A damaged building cannot in itself revert back. Restoring the usual work of a school after a hazard strikes is the responsibility of those who manage schools, teachers, parents and the community at large, including institutions that set norms, values, behaviors

FIGURE 1 RESILIENCE ACCUMULATION IN RECONSTRUCTED SCHOOL



Adapted from Conway et al (2012)

and actions. In the case of school buildings, agencies such as the Ministry of Education (MoE), Department of Education (DoE), local government units and School Management Committees (SMCs) and public policies relating to education, water, construction and technology are involved. The different agents and institutions play a major role in making resilience an ongoing and continuous effort. Resilience building therefore needs to conceive a fail-safe school building while sensitizing, educating and capacitating actors and institutions to pursue continuous learning for dealing with new hazards, disruptions and changes.

There is a need to look back and draw lessons from past efforts to envision how resilience and a child-friendly learning environment can be combined in rebuilding damaged schools. Doing so requires more creative and iterative approaches that bring the government, community, teachers, students and parents together to identify deficiencies in safety and comfort and for

Collapsed wall

creating the learning ambience. They also need to come together to articulate how these attributes can be incorporated in the reconstructed school buildings. An effort that only considers physical construction, and not agencies and institutions, cannot be resilient, and is likely to replicate the same vulnerabilities that made schools unsafe in the first place.

In a school, the relationships among the physical structure, services, students, teachers, parents, and other stakeholders are the fundamental in incorporating resilience thinking that would then lead to child-centered and context-specific education (Figure 1). Resilience is not same as robustness but is an inherent strength, and harnessing it requires continuous questioning, dialogue and reflections. A physical structure cannot be made 'fool-proof' to all types of shocks; rather, the notion of safe-fail can create space for building back better with users and institutions as key actors of this process.

CHAPTER 2

Study Objectives and Methodology

Study objective

This study has taken a broader perspective on rebuilding of schools. To that end, it has sought evidences from 11 community schools of Jiwanpur Village Development Committee (VDC), Dhading District that was seriously affected by the Gorkha Earthquake. This study has produced grounded evidence around the idea of resilient school buildings and services. Overall, the objective was to generate an understanding that will help mainstream resilience in the reconstruction of damaged school buildings. Specifically the study has:

1. Documented the status of the school buildings and services;
2. Assessed their functionality as well as ambience of learning, comfort, safety, school-community relationship and disruptions that the earthquake caused to these attributes;
3. Examined if school buildings can be merged during recovery and reconstruction processes; and
4. Synthesized learning into evidence-based knowledge to inform the policies directed towards the recovery and reconstruction of school buildings and services.

The Approach

Among the schools included in this study, three were primary; four were lower secondary; three were secondary and one was higher secondary. The approach involved conducting a diagnostic exercise in which each school was treated as a case; in-depth inquiries were conducted in each case. The process involved assessment of the infrastructure, services, teaching and learning ambience, damage caused by earthquake, aspirations for reconstruction as well as the relationship between schools and local communities. Cross-sectional perspectives of students, teachers, members of the school administration as well as members of the community were collated.

The study involved the following concurrent stages:

1. Development of tools of inquiries and data collection;
2. Pilot study to refine the tools of inquiries;
3. Field study;
4. Analysis and synthesis of information; and
5. Report preparation.

Each stage is elaborated in the following sections.

Development of Tools of Inquiries

Prior to fieldwork, two rounds of discussions at the ISET-Nepal office covered the objectives, the focus of the study, the questions and direction of the inquiries. Researchers from ISET-Nepal and RBF jointly developed a checklist for collecting information. Three methods – focus group discussions (FGD), key informant interviews and observation of the school buildings and services – were used.

FIGURE 2 KATHMANDU VALLEY AND JIWANPUR VDC

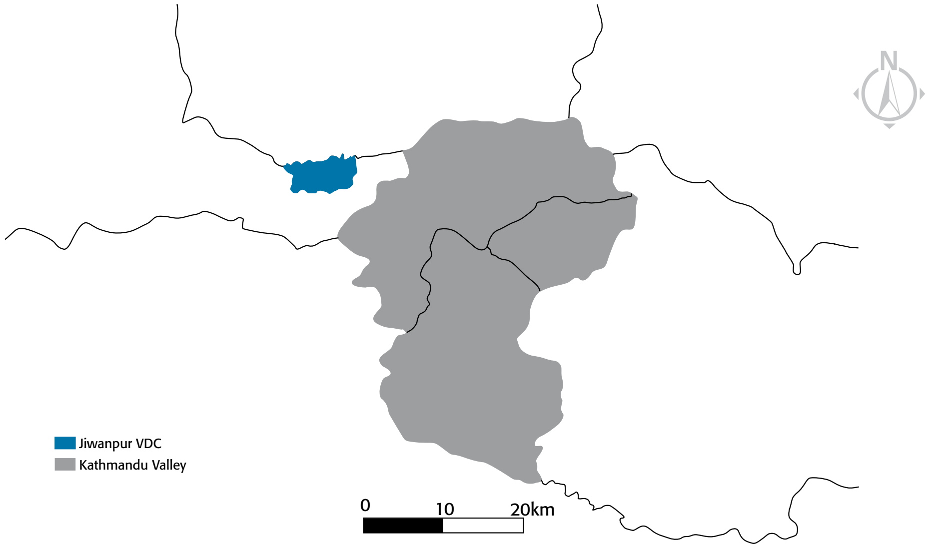
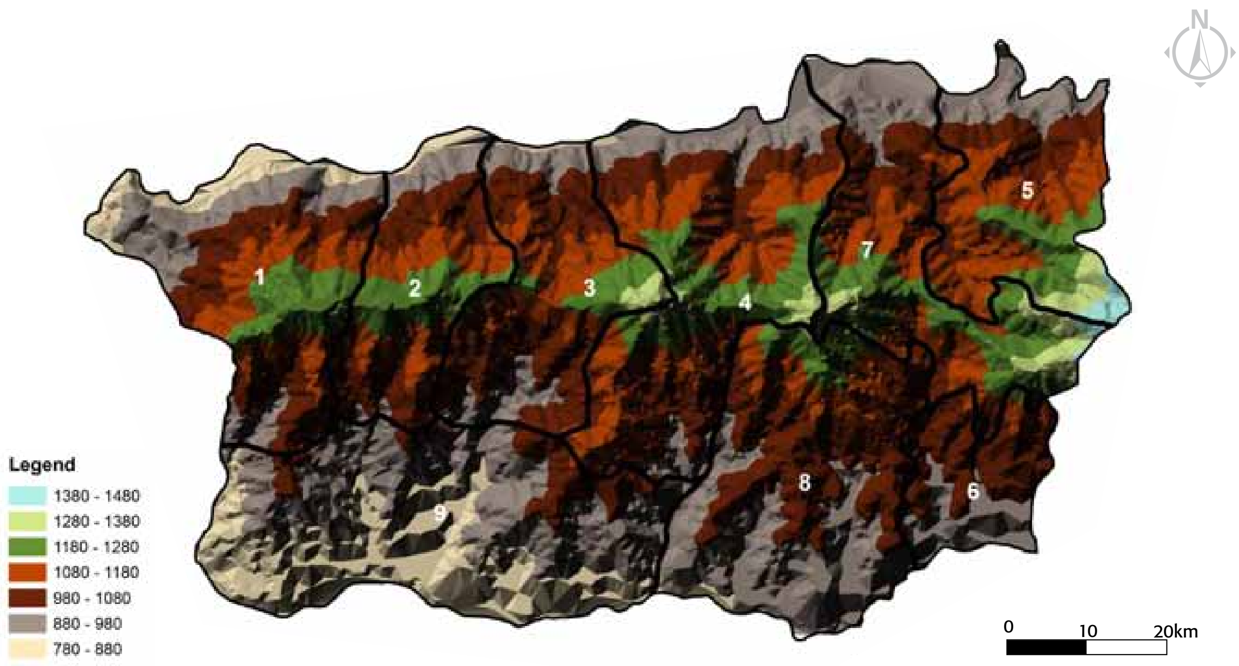


FIGURE 3 ELEVATION MAP OF JIWANPUR VDC



Mothers group meeting outside school premise

Pilot Study: The tools developed were pre-tested in Bhattedanda Lower Secondary School Bhattdanda VDC, Lalitpur District. This process involved interaction with students, teachers, school staff as well as members of the community. The insights from the pilot were used in refining the checklist.

Orientation of Enumerators: Six enumerators were provided orientation at ISET-Nepal office to independently conduct the inquiry in the field. They were also trained to use GPS trackers. Ethical considerations were discussed with the enumerators to guide their conduct during the fieldwork. The enumerators were divided in three groups: each group involving two enumerators and one researcher from ISET-Nepal. Likewise, senior researchers from ISET-Nepal accompanied the team for two days in the field to ensure the quality of fieldwork.

Fieldwork

The fieldwork involved the following activities:

Physical Observations: Observations of the school infrastructures, services and the conditions of other community infrastructures in the vicinity. This step helped understand the damages caused to infrastructures and services and the state of recovery and reconstruction efforts. GPS was used to locate the school buildings. Efforts were also made to assess damages that the earthquake caused in the social and institutional realms.

Focused Group Discussion: Focused group discussions (FGDs) were conducted separately with students, teachers and parents in each school. This discussion helped document the perspectives of each group on school infrastructures and services, teaching and learning ambience, health and safety concerns and issues related to the reconstruction of damaged schools. One team member facilitated the discussion using the checklist while the other two recorded the perspectives of the participants.

Key Informants' Interviews: Interviews with key informants were used to substantiate the data obtained from the FGDs. The key informants included the school principals and those involved in school management committees. A semi-structured questionnaire was used for this purpose.

Poor detailing of corner and element

CHAPTER 3

Ruptures in the School Buildings and Services

Socio-Economic Context

Jiwanpur VDC has a geographical area of 26.6 km². Though the VDC is predominantly rural, its proximity to Kathmandu along the Prithivi Highway embodies a characteristic that is transiting from rural to peri-urban. Its altitude ranges from 769 to 1,490 meters above sea level. In 2011 Jiwanpur had a total population of 8,837 (4,334 male and 4,503 female, VDC Profile 2014) living in 2,005 households (CBS 2012).

The majority of the population of the VDC comprises of Brahmins, followed by Chettris and Tamangs. The VDC also has smaller populations of Newar, Kami, Damai, Sarki, Magar, Sanyasi, Gharti, Thakuri and other caste/ethnic groups. Agriculture is the mainstay of the people though some are also involved in non-agricultural activities such shops and small agro business to supplement their farm incomes.

Profile of Damaged School Buildings

According to the statistics published by the Department of Education (DoE), Dhading District had 634 primary, 227 lower secondary, 135 secondary, and 51 higher secondary schools (DoE 2012). Of these, the 2015 earthquakes

TABLE 1 SCHOOL DEMOGRAPHY

Name	Year Established (B.S)	Students			Classes	Teachers
		Male	Female	Total		
Shree Khaireni Lower Secondary School	2033	75	79	154	9	8
Shree Jiwanpur Kulchandra LSS	2040	71	94	165	9	9
Shree Nava Prativa PS	2053	30	15	45	6	6
Shree Mahankaleshwori Sec. School	2041	134	140	274	10	13
Shree Trikuteshwori	2020	89	96	185	9	9
Shree Kalika PS	2061	33	20	53	5	4
Shree Chandeshwori PS	2053	23	37	60	5	5
Shree Sharada LSS	2031	31	39	70	6	5
Shree Bhuvaneshwori Sec. School	2016	274	315	602	12	15
Shree Mahadevsthan Sec. School	2046	142	256	114	11	13
Shree Mahesh Dharma HSS	2011	173	165	338	13	16

Source: Field work (2016)

FIGURE 5 JIWANPUR VDC AND LOCATION OF SCHOOLS IN GOOLGE MAP

Schools in Jiwanpur

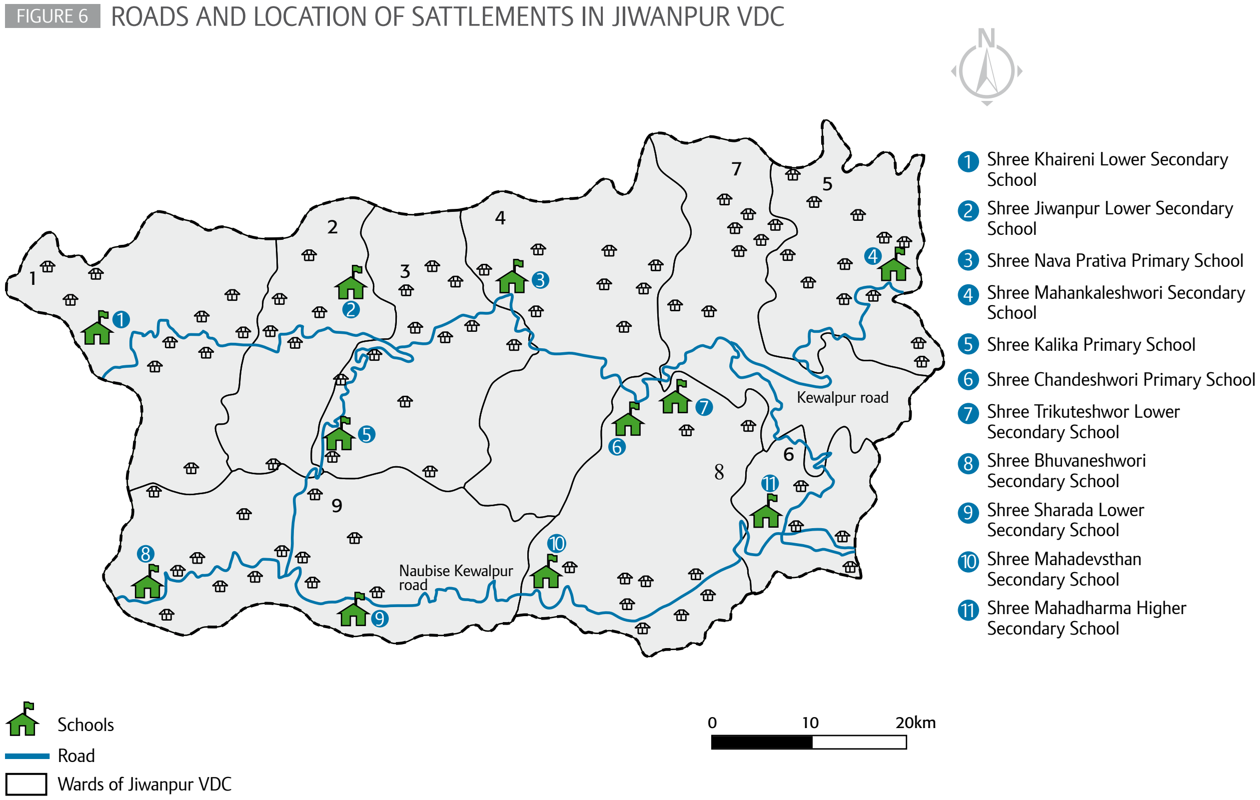
damaged 378 primary, 80 lower secondary, 77 secondary and 49 higher secondary schools. Estimates suggested that 587 schools and 2,746 classrooms were completely destroyed.[7] In the study area, two of the 11 schools included were intact and were not seriously damaged while the other schools were either partially or completely damaged.

The schools were built at different times. The nature and quality of infrastructures widely varied and so did the damages caused. While cement-concrete columns and beams were used in a few schools, others were built with stone masonry walls and CGI sheet roofing. The schools were within or close to the settlements but some of them were also at a distance from settlements. The noticeable feature of the schools was that the majority of teachers were outsiders and only a few of them lived within the VDC.

Restoring Functions after Earthquake

Because of the damages, all schools cancelled classes for more than a month after the earthquake. Immediately after the earthquake, the community gathered to clear the debris and dismantle damaged components of the buildings to minimize risks of accidents and injuries to children. There was a pressing need to bring students back to classes. Therefore, MoE requested humanitarian, aid agencies and child-centered NGOs to support the development of Temporary Learning Centers (facilities to conduct classes) to operate in place of the damaged school buildings.

FIGURE 6 ROADS AND LOCATION OF SATTLEMENTS IN JIWANPUR VDC



Temporary Learning Centers (TLCs)

Association for Aid and Relief (AAR) Japan, Japan Platform and Chandra Jyoti Integrated Rural Development Society (CIRDS), Dhading helped build TLCs in Jiwanpur. Other humanitarian and aid agencies, such as Japan International Co-operation Agency (JICA), Prayas Nepal, UNICEF, Sheshkant Foundation, Lion's Club, and Wildlife Conservation Nepal (WCN) distributed books and stationeries. Some individuals also contributed cash, stationery and books.

Minimizing Trauma

The children had witnessed the collapse of their houses and deaths of their family members and friends. This had distrubed them psychology. The condition of teachers and parents was no different. Most parents admitted that they felt insecure to send their children to school immediately after the earthquake. Severely shaken, children would often hold onto their mothers. Even a slight movement of the CGI sheets of the TLC or their own temporary shelter by wind would frighten them. The parents sent their children to school only when the teachers convinced them that the TLCs were safe.[8] One parent said, “Our family is living in a single room temporary shelter, we have been unable to provide an environment for our children to study. It is affecting their performance. We know that studying in school is not enough, children should also study at home but at present we are not in a position to rebuild our houses anytime soon.”

TABLE 2 SCHOOL TYPE AND PHYSICAL DETAILS

Name	Location	Area m² (1Ropani=508.72 m²)	No. of Rooms	No. of Story	Building type	Services
Shree Khaireni Lower Secondary School	Jiwanpur-1, Diwalibhanjyang, Jimmalgaun	3358	11	2	RCC	TLC
Shree Jiwanpur Kulchandra LSS	Jiwanpur-2, Amreni, Ratamata tol	2137	12	2	RCC	TLC
Shree Nava Prativa PS	Jiwanpur-4, Tamaguru	1272	8	2	RCC	N/A
Shree Mahankaleshwori Sec. School	Jiwanpur-5, Chhapdanda, Damadhunga	3717	12	2	(Damaged RCC)	TLC
Shree Trikuteshwori LSS	Jiwanpur-7, Tersepani	1781	11	2	RCC +truss	N/A
Shree Kalika PS	Jiwanpur-3,Kolachaur, Gajurelgaun	1526	7	1	Truss	TLC
Shree Chandeshwori PS	Jiwanpur-8, Dhakalkhola, Pandhera chaur	4070	9	2	Brick-block, truss	N/A
Shree Sharada LSS	Jiwanpur-9, Amalechaur, Arjeltar	5087	8	2	RCC	TLC
Shree Bhuvaneshwori Sec. School	Jiwanpur-9, Purano Dharke	6105	21	2	RCC	N/A
Shree Mahadevsthan Sec. School	Jiwanpur-8, Kumaikhola	4070	15	2	RCC	TLC
Shree Mahesh Dharma HSS	Jiwanpur-6, Purandanda	2610	14	2	RCC + Truss	TLC

Source: Field work (2016)

Students' and Teacher's Counseling

Organizations like RBF, Changa Society and AAR-Japan organized psycho-social counseling sessions targeting the students and teachers to improve their mental and psychological state to face the losses in their family, neighbors, community and schools. The counseling aimed to rebuild confidence and overcome mental shocks. The teachers who attended counseling sessions were expected to organize similar sessions for children of different age groups in the schools.

A series of counseling sessions followed the resumption of classes. The activities ranged from group exercises to organizing different games for the students, which eventually helped to restore normalcy in the classrooms.

The program aimed at inculcating the basics of safety measures during an earthquake. In addition, the sessions covered ideas of proper management of students during an earthquake. The counseling programs were unique to these schools in that no such sessions had been held in the past though training programs on disaster, and safety drills, had been conducted on an annual basis. The program made teachers and students appreciate that the general idea of 'drop, cover and hold' would not be enough. Recognizing the positive impact of counseling on families and children, three schools jointly organized similar programs at the community level. In addition, the programs also involved cultural shows by celebrities. This helped the locals to address their grief, and had a positive impact on students.

Temporary learning center

Some parents in the FGDs said they did not receive counseling and that women, senior citizens and the disabled faced mental shocks in very different ways. Nonetheless, they thought that the counseling sessions organized in the schools helped their children to come out of trauma and build their confidence to face similar events in the future. The parents suggested that stationeries and books provided by individuals and aid agencies also motivated children to attend school.

In order to better understand the value of counseling for overcoming trauma, the perspectives of the teachers and the students were collected separately. They are as follows:

Teachers: In the immediate aftermath of the earthquake, students were frightened to come to school. Younger students were particularly traumatized by the aftershocks. For instance, they would hold on to their mothers and refused to leave home. During class, they would cry or shiver from fear that the earthquake would reoccur. Counseling sessions were organized and extended over a week, and in some cases for more than a week. In the first week following the event, the number of children coming to school was very low because their families had migrated to safer areas. Others, whose houses had collapsed and not recovered their belongings from the debris, were not in a position to send children to school. It was only few weeks after the second major aftershock on May 19 that the schools returned to regular schedules.

Temporary learning center and school building

Students: All students were scared. Many said they witnessed their houses collapse in front of their eyes while a few had witnessed death of family members, neighbors and friends. They said they felt much better after the school resumed. Meeting friends after a long time and participating in activities that the teachers introduced (i.e. singing/dancing), helped them reducing stress. A student from class 9 of Mahesh Dharma School said, "The earthquake damaged our school building and destroyed desk and benches. At present we are studying at the temporary learning shelter, which is very hot in the summer especially in the afternoon and very cold in winter. In addition, lack of rooms and desks and benches mean that 60 of us have to fit one room with limited desks and benches."

Community Support

Community members helped schools to clear the rubble from their compound after the earthquake. However, as time passed, community members became increasingly hesitant to provide free labor and financial support for school reconstruction and recovery, as they had to focus on recovering their own homes and livelihoods. This initial support made it possible for the classes to resume after the earthquake.

CHAPTER 4

Perceptions on Reconstruction

The researchers asked the teachers, students and parents how they envisioned reconstruction of the schools. They were asked to share their views about safety, comfort, aesthetics and functionality of school buildings and services. The focus was on ways and means that would tangibly improve the teaching-learning environment and quality of education. The perceptions are discussed below.

Envisioning reconstruction of school buildings

The teachers felt that rebuilding schools must systematically incorporate elements of safety, functionality and comfort. They suggested that students must feel safe at school. The idea of safety, as they suggested would be critical to improve attendance as well as student's performance. They also mentioned the need of proper ventilation, thermal insulation and lighting in the classrooms. Likewise, when the students were asked about their aspirations of a safe school building, most of them suggested that they preferred a single storey one over a multi-storey building. The teachers had preferred a maximum of two storey buildings. Students said the rebuilt schools should be both structurally safe and functional. They added that cement-concrete school buildings are more earthquake resistant and should therefore be preferred.

Overcoming deficiencies

As mentioned above, the earthquakes partially or completely damaged nine schools of Jiwanpur. Both the teachers and students complained that in the damaged facility both staff rooms and classrooms, their sizes and nature of the roofing as well as the flooring, were deficient. The buildings lacked a comfortable and proper learning atmosphere. Most of the teachers and students said that rebuilding school families should avoid past deficiencies. They highlighted that the deficiencies observed in old buildings must be overcome, and measures taken to develop better schools while rebuilding them.

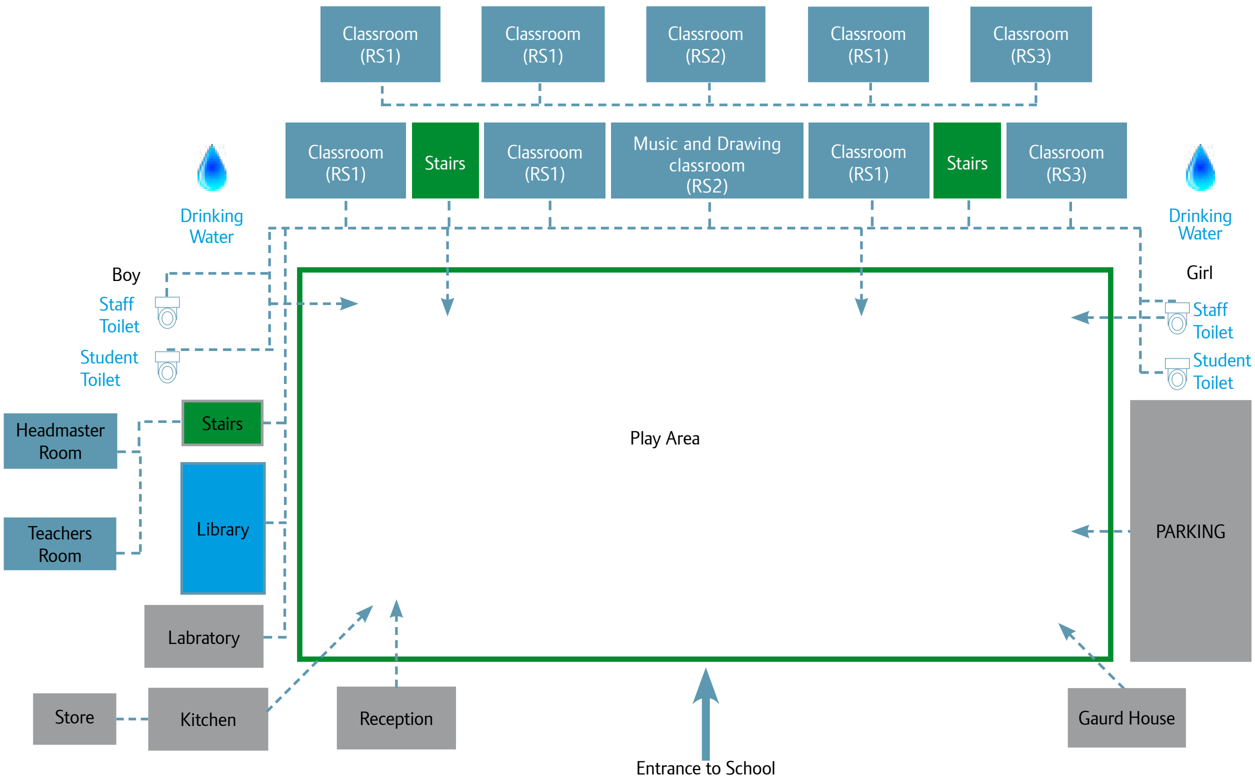
Space and functionality

With regards to physical space, teachers from six schools said it was inadequate while teachers of three schools said that it was somewhat adequate while for two it was adequate. Likewise, when asked about the adequacy of space for future expansion of school buildings and services, teachers professed different views and there was no consensus. Similarly, seating arrangements within the classrooms were said to be constraining, as it did not allow easy movement for the teachers and students. Likewise, most of the teachers said the corridors were small and were congested and prevented immediate and safe exit during emergencies. It was clear that available space and functionality was deficient and that reconstruction of schools should look into these aspects.

Environmental comfort

In most cases, teachers and students were unanimous to point out that the lighting, ventilation, thermal comfort during summer and winter were inadequate, and did not offer an ambience that was conducive for learning. When classes shifted to TLCs, lighting and ventilation were adequate but thermal comfort in summer and winter was poor because of CGI roofs and walls. In some cases, bamboo splits were used but they did not provide

FIGURE 6 CURRENT PROPOSED SKETCH OF SCHOOL



Lower Secondary and Secondary School (TD-LS1, TD-LS2, TD-SS1, TD-SS2 & TD-SS3
School Size (Small-Large), Student Number up to 480

Source: DoE (2016)

protection from heat and cold. Most teachers and students hoped that the new school buildings would be comfortable for studying in both hot and cold climates.

Ten schools had libraries, but their rooms were small. After the earthquake, 10 schools did not have adequate drinking water and that for sanitary uses. Similarly, almost half of the schools lacked separate toilets for boys and girls. On a more positive note, almost everyone said that the solid waste was properly managed either by burning the waste or dumping it in a pit. Overall, each school lacked adequate utilities and services necessary for an appropriate teaching atmosphere.

Risk of multiple hazards

Teachers, parents and students from most of the schools said they felt safe from other natural and human-induced hazards except earthquakes.[9] Few said that they felt safe and secure inside the school buildings before the earthquakes, but do not feel the same after April 2015. Similarly, two schools faced the risks of landslides. At one, concerns of theft were raised. They said that they felt safe from natural hazards but were scared of inappropriate conduct.

Teachers-parents interface

Teachers and parents from all the schools said they interact with each other, though the frequency varied from school

Earthquake sensitive and climate adapted school design

Adapted from DoE (2016)

to school. At few schools parent-teacher interactions took place on a bi-monthly basis. At others, it was occasional and in some cases rare. The issues discussed at these meetings related to the performance of students, the level of guidance at home, childcare and grooming.

Parents felt that counseling by teachers was rare, and even if it was provided it was related to the child's health or performance at school. However, after the earthquake, some teachers did provide counseling on disaster preparedness. Both teachers and parents acknowledged the importance of counseling and parent-teacher interactions to improve the performance of both the students and schools.

Community and school partnership

In most cases school buildings were used for holding public and social activities such as vaccination programs, health camps and community meetings. The frequency of public and social activities varied from school to school. At some schools, such activities were held twice a year, while at others as many as 10 to 12 times in a year. Likewise, in a few cases, the premises were also used to shelter the earthquake victims.

Both teachers and parents favored the use of the school buildings for larger social benefit, provided that such events do not hamper regular teaching-learning schedules. However, they strongly opposed use of schools for political purposes and suggested that schools should be kept immune from political interferences. They suggested that community uses would help foster ownership needed for improving the schools. At one of the schools, the community helped to expand its area by procuring land with money collected by organizing a religious function.

Counseling session

CHAPTER 5

Synthesis and Learning

The insights from this study are useful for explaining the notion of resilience in connection with re-building schools affected by the Gorkha Earthquake. Resilience of a school is not a standalone outcome but can be examined in combination with various other elements. Indeed, physical infrastructure is a key factor but whether it is safe from hazards, including that from earthquake, depends on a set of secondary considerations such as: the quality of design; how teachers, parents and students appreciate the design; and the quality of infrastructure built and maintenance. In this case, the quality of a school building is also a function of the skill set available, adherence to basic engineering standards and detailing of structural elements, supervision and quality control.

The schools in Jiwanpur are similar to community schools in other parts of Nepal. Most of the school buildings were built incrementally, by adding rooms as and when financial resources were available. In fact, the resources available were always far less than what was actually needed for a well planned and executed facility. Parents sent children to school only if it had a proper building. School building was further expedited by the GoN objective of providing universal education coverage. Though appreciable, this process did not simultaneously accord priority to quality. Post earthquake Nepal offers opportunities for rebuilding schools in ways that take safety, comfort and quality into account. The following factors should be considered for adding value to rebuilding of the schools:

Developing and enforcing standards

Evidently, school buildings must follow stricter engineering standards that need to be enforced. Following the basic tenets of building construction as outlined in basic civil engineering is a useful starting point. In addition, there already exist a suite of school designs prepared in the aftermath of the 1986 Earthquake. Some of designs have already been implemented in some of the affected areas. These buildings survived the shock of the Gorkha Earthquake. It would be useful to assess the performance of these buildings in the recent earthquakes and to refine the 1986 designs based on the consequent observations. Developing and enforcing standards must focus on building capacities to implement the rules for ensuring safety of school buildings. Local institutions also need to be strengthened to regulate and enforce quality construction of school buildings.

Redundancy and modularity

Resilience will be enhanced if new designs incorporate redundancy; it must be noted that including redundancies will add to the cost of constructing a building. In a physically built system redundancy refers to addition critical components that aim at or increasing reliability and avoiding total failure. The ideas need to be further developed and explored in case of social and institutional systems. In school education this idea would relate to allocate and use of the available resources, skill and institutional capacity. It also needs be expanded to consider a broader base of livelihoods, education policy, capacity, land use, enterprises as well as water and energy systems.

During the study the idea of school merger, so as to bring the idea of redundancy was also examined. GoN has been suggesting that schools be merged. In many places, number of schools outnumbers the students and there are proposals for merging two or more schools into one to optimize resources. While this seems to be a logical step, supplementary schools could prove to be immensely beneficial during a disaster. It could be argued that more schools provide an inbuilt geographical redundancy. In case one school is damaged, the next one could serve as temporary learning space. During the study we examined the idea of merger of schools, but in 10 schools out of 11, both teachers and parents were unenthusiastic about merging. Students of one school supported the idea.

The location of school played an important role in shaping this perception. Teachers, students and parents felt that the merging would increase the commuting distance for both teachers and students. Children who already walk one and half hours to get to school would have to walk longer – and this could hamper attendance. There were questions about independence of schools, authority to make decisions in using undamaged schools as TLCs in a post hazard circumstance. The perspectives on improving effectiveness and efficiency of school education in normal circumstances as well as immediately after a hazard strikes could not be achieved in a single FGD session. The issue of merging schools will require much deeper interactions with teachers, parents, students and government agencies.

In addition, the following considerations need to be incorporated into the design process:

- Increased preference on "local measures" to maintain water supply, energy and communication in schools such as rainwater harvesting system and solar panels. In normal circumstances a rainwater collection system could serve as a source of water for sanitary uses while solar panels ensure reliability of power for computer-based learning.
- Planning for distance education using FM radios and other communication media as additional mechanisms that can impart teaching and learning are not disrupted when high intensity hazards such as earthquakes or floods damage schools.
- Put a local mechanism in place so that local governments and decision makers can draw lessons from actions, present them to local level policy makers, revise strategies and implement them.

A building can be standardized and modularized to optimize cost, and ensure better quality construction. But the approach would require better regulation, supervision and monitoring. Modularity can be introduced incrementally for supporting the objective of building back better and incorporating resilience. In fact DoE has proposed standardization, and a modular approach to reconstruction of schools damaged by the Gorkha Earthquake though each school would have its unique requirement. The DoE has prepared "Type Design" incorporating functional, architectural, structural, and infrastructure design of new school buildings.[10] The elements include:

- Modular sizing and layout of classrooms
- Modular sizing and layout of buildings
- Modular dimensions for most of the building components such as doors, windows, fittings, fixtures, size of panels, brick and blocks.

It is important to regularly use school education as a means to propagate the idea of earthquake sensitive construction. This needs to incorporate themes as laid at in the table below.

Integration of green elements

In all the cases, environmental comfort received the least priority. Buildings were designed without considering wind direction, solar exposure, temperature and heat. The roofing in most of the cases was made of CGI sheets, because they are readily available in the market, installation is easy, and was done by skilled locals. The flipside is that the CGI sheet roofs provide no insulation, making rooms unbearably hot in the summer and cold in the winter. Much can be achieved by covering the CGI

TRAINING CURRICULUM

Module 1 **Theory of Earthquakes**	Module 2 **Earthquakes Risk of Buildings**	Module 3 **Earthquake-Resistant Construction Techniques**
What is an earthquake How earthquakes occur Why earthquakes concern us In what ways earthquakes damage buildings	Differences between earthquake force and normal force Critical structural components of building in earthquake Structural response of building to earthquake Weak aspects of Nepal's building stock Consequences of structural failure	Retrofitting masonry building Earthquake-resistant construction of masonry building Earthquake-resistant construction of framed building Quality control in construction

Adapted from ADPC (2003)

roofs with straw and other local materials for insulation, though this would increase maintenance support. More empirical work in terms of identifying the usefulness of materials, their durability and suitability is needed. Integration of local varieties of trees, hedges and plants within school premises and along the boundaries would help improve ambience and environmental comfort. The vegetation will produce shade, work as windbreak, and also provide a living-fence along the boundary and help to modulate temperature in summer.

Utility and services

Development of systems for services such as drinking water, separate toilets for boys and girls, rainwater drainage and disposal of solid waste can help create healthy and comfortable learning spaces. Thus, incorporating these elements in the reconstruction of school buildings and making them integral to the process are important. In many earthquake-affected villages, drinking water sources as well as supply systems have been damaged. Maintenance and upkeep of core utilities and services are important – one time investment in building the services does not guarantee that system will function in the long run. This was clear in Jiwanpur where the drinking water facility and toilets in schools functioned inadequately due to a lack of maintenance and upkeep.

Other uses of school buildings

School buildings are important assets of the local communities as they play multiple roles. This is especially true in rural areas where available space and facilities for holding community-based activities and state-led service delivery are often limited. When school buildings are planned, designed and constructed, their multi-purpose uses are not considered. Multi-purpose uses of schools can also strengthen community ownership. Efforts should also be made to provide rainwater harvesting systems, and access to renewable energy such as solar and wind.

Location of schools

The location of a school determines the level of access to education in a significant way. Each school caters to the community in its periphery. In cases where schools are located away from the settlements, enrollment and attendance of students decreases. While distance and time to commute to the schools is important, their location should also be safe from hazards. A site prone to risk of landslide or seismic liquefaction is undesirable.

Drinking water stand and toilet

CHAPTER 6

Resilience Thinking in Rebuilding of Schools

This study has reinforced what is already known: earthquakes do not kill but unsafe buildings do. The damaged school buildings were unsafe because of low quality construction, poor regulation, lack of institutional capacity and low level of awareness about safety during disasters. These limitations mean that there are damages in not just the physical, but also in the social and institutional sense. Yet, opportunities exist for avoiding past oversights as school buildings are reconstructed. This process must also improve education quality, invigorate the local economy and create new livelihoods. In Jiwanpur and other places, it is important that the efforts of school building reconstruction is done as a shared vision of the community, the students, teachers, the government and donors.

Two important lessons emerge from this study. The first is that there is an appreciation in the local community that school buildings that existed before the earthquake were deficient. Schools were built without sufficiently considering functionality, safety, comfort and ambience for learning. Secondly, the earthquakes of April-May 2015 have sensitized people to invest in developing safer school buildings and services given the multiple risks that Nepal faces including earthquakes and water induced hazards. Reconstructing school buildings and services damaged by the April earthquake as soon as possible is a priority, but this process must also avoid past deficiencies and embed resilience as a concept and process. The suggested elements if incorporated in the reconstruction of the damaged schools can serve as an approach that can bridge people's aspirations for a better future.

The lessons from on going research can be useful for rebuilding better schools and also for creating tools for enhancing development capacity. The following sections suggest ideas for resilience thinking while schools are rebuilt as that can contribute towards improving education quality and to Nepal's overall development.

Continuous learning

The Gorkha Earthquake occurred while Nepal was in multiple transitions in society: high in country rural-urban migration, blurring rural-urban divide, high out migration, reduced interest of youth in agriculture, expansion of communication technology, and increased road connectivity. These contexts are important to recognize because understanding resilience is a continuous learning process within these changing social and physical landscape. Continuous assessment, reflection and learning will be needed for effective reorganizing, functioning and developing. Resilience building cannot be a one-shot effort.

Iterative process

Resilience building effort cannot be linear and mechanistic. It would require assessing vulnerability as a starting point. Vulnerability is dynamic and therefore a one-time assessment cannot suffice. The process must allow local stakeholders to evaluate the efficacy of the assessment and resilience-building actions. The changing dynamics within a VDC is linked to larger context as new constructions, changes in land use and flows of resources and people take place. These processes impinge on resilience and need to be understood better through continuous learning.

Learning-oriented approach

Local institutions must be able to learn and maintain flexibility to readjust to changing circumstances. This is perhaps one of the greatest challenges for mainstreaming resilience. Local government organizations are involved in some level of planning, budgeting and program implementation but have little incentive for learning. It is not clear how they would develop continuous learning capacity. Much can be learned from performance of local groups managing forest and other natural resources in the promotion of resilience thinking. Issues such as accountability, transparency, multi-stakeholder dialogue and self-assessment are useful in building resilience.

Current change process as starting point

The changing nature of the local human ecology implies possibilities of new sources of vulnerabilities. Specific impacts on particular places, sectors, and people are important but focusing only on them can undermine the ability to learn and reorganize as that may constrain resilience. Vulnerability assessments for resilience should start by analyzing the trends of on going changes. Such understanding can be used to envision future scenarios. The activities identified and actions taken today to address current challenges in a way can set a direction for a more resilient future.

Informed public dialogue

Building resilience is also about values and making choices for which new knowledge and viewpoints must be brought together. Informed dialogue processes must be continuous and self-sustaining to undertake resilience-building actions. Public dialogue platforms can help identify socially appropriate steps to improve resilience. Pursuit of this process requires a shift from traditional information dissemination approaches to developing more collaborative, cooperative, and engaging ways.

From beneficiaries to partners

Who benefits and in what ways are important. For resilience-building efforts, it is important to identify a clear strategic direction in which beneficiaries take ownership for actions. The focus must be to build partnerships for defining problems, identifying causes, solutions and action, and in developing indicators to measure success.

Community science

As continuous learning is key to resilience thinking, it will be important to involve local communities in generating much-needed information on local level ecosystems. For example, most VDCs in Nepal do not have local level data on temperature, rainfall, geography and maps of the locality, and the local quality of air and water. Government agencies lack personnel and budgets to take on local monitoring responsibilities. Involving schoolchildren in regular monitoring by taking advantage of technology (though internet and applications) has the potential for generating information at low cost. Such actions can make learning enjoyable, exciting and context sensitive. While the knowledge can empower the locals, it can also inform the global debate when solutions to challenges such as climate change, ecosystem degradation and lack of local employment are sought.

Yet, there is a tendency of believing in a 'silver bullet' resilience-building approach. Resilience depends not only on a suite of actions—and associated knowledge, technology, and innovation—but also on processes that promote learning, reorganizing and changing strategies when faced with new challenges. Such a conception will be helpful in ensuring and building resilience as the reconstruction process gathers momentum.

Notes

1. Holling (1973)

2. In Muzaffarbad more than 80,000 people lost their lives, 200,000 were injured and more than 3.5 million were left homeless. About 17,000 school buildings and hospitals collapsed. The Saturday that the earthquake struck was a normal school day and students were inside and as buildings collapsed about 19,000 children died in the earthquake. See Khan and Mustafa (2007) for details.

3. It is difficult to exactly specify the number of such families. Quoting a report by OXFAM CNN< says “”There are no definitive numbers, but Oxfam, the international organization that works to fight poverty, estimates most of the 660,000 families who needed shelter are still living in temporary or unsafe accommodations one year later. Another 26,000 people remain displaced in camps, under plastic tarpaulins or corrugated metal sheets. See Basu, Moni; CNN, "Nepal, a year after the quake: Help us" http://edition.cnn.com/interactive/2016/04/world/nepal-one-year-later/

4. According to Ministry of Education GoN, the Gorkha Earthquake fully destroyed more than 27,000 classrooms and partially damaged more than 26,000 classrooms. The cost of education sector recovery is estimated at almost $ 415m USD.

5. www.nra.gov.np/news/details/75

6. See Paci-Green, et al (2015)

7. https://thehimalayantimes.com/nepal/earthquake-hit-schools-still-ruins/

8. This decision must take cognizance of the surrounding of the schools, landscape and quality of construction. In one unfortunate case in 2016 the section of a temporary school was covered by a wall of a adjoining property killing two young students. A much stringent regulation in the location of school and construction is necessary to avoid similar accidents in the future. Since 2009, Nepal Risk Reduction Consortium (NRRC) is pursuing the idea of safer schools. The consortium is implementing school and hospital safety program with Ministry of Education, Ministry of Health and Population, Asian Development Bank UNICEF and WHO. The other programs of NRRC are emergency preparedness and response capacity, flood management in river basins (Ministry of Irrigation, World Bank), integrated community-based disaster risk reduction and policy/institutional support for disaster risk management.

9. DoE (2016) has also suggested steps for considering other hazards such as landslides when rebuilding schools.

10. For details see Guidelines for developing Types Designs For School Building in Nepal (2016) Asian Development Bank (ADB), Department of Education (DOE) and JICA. The table is adapted from ADPC (2003). The School Earthquake Safety Program in Kathmandu Valley Building safer communities through schools was conducted by National Society for Earthquake Technology (NSET), GeoHazards International (GHI), USA 200 Town & Country Village, Palo Alto CA 94301, USA with support from USAID under the Asian Urban Disaster Mitigation Program.

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